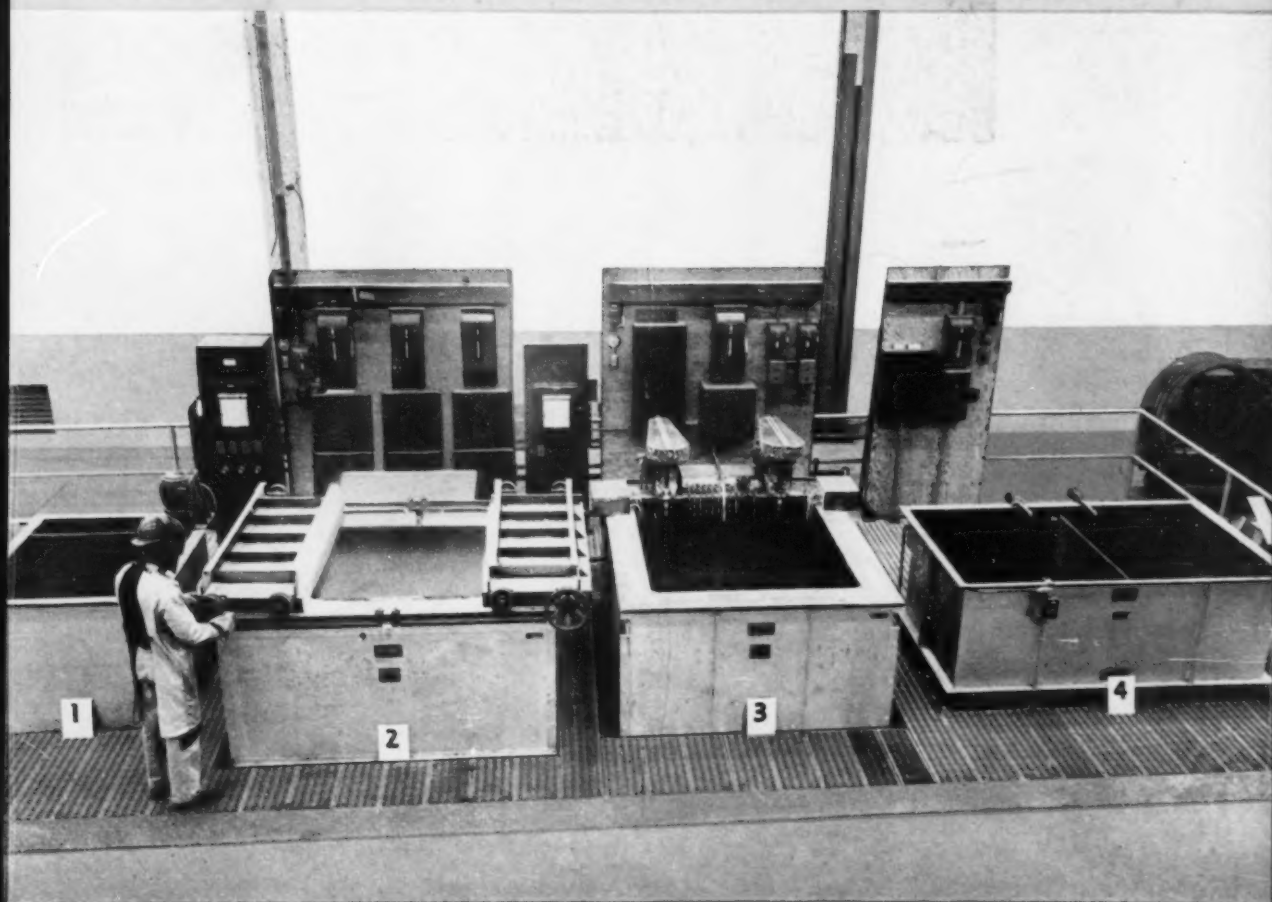


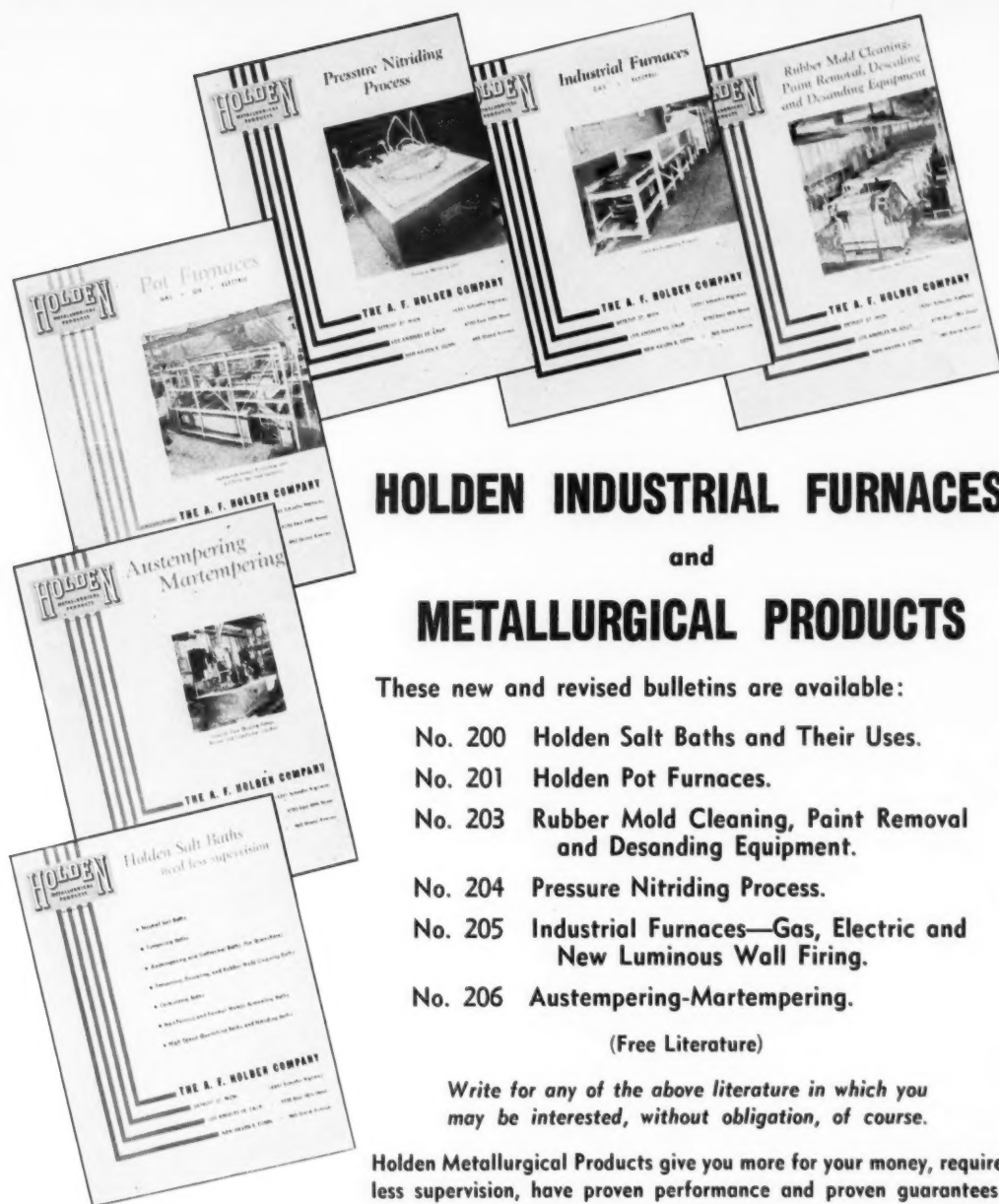
117  
AUG 17 1956

July-August 1956

# METAL TREATING

Importance of Isothermal heat treating procedures (see page 2) is spotlighted by installation at Rohr Aircraft Corporation, Chula Vista, California. (1) Oil quench tank; (2) austenitizing furnace; (3) quenching furnace; and (4) hot water rinse tank. Photo courtesy of Ajax Electric Co., Philadelphia, Pa.





## HOLDEN INDUSTRIAL FURNACES and METALLURGICAL PRODUCTS

These new and revised bulletins are available:

- No. 200 Holden Salt Baths and Their Uses.
- No. 201 Holden Pot Furnaces.
- No. 203 Rubber Mold Cleaning, Paint Removal and Desanding Equipment.
- No. 204 Pressure Nitriding Process.
- No. 205 Industrial Furnaces—Gas, Electric and New Luminous Wall Firing.
- No. 206 Austempering-Martempering.

(Free Literature)

*Write for any of the above literature in which you may be interested, without obligation, of course.*

Holden Metallurgical Products give you more for your money, require less supervision, have proven performance and proven guarantees.

## THE A. F. HOLDEN COMPANY

THREE F.O.B. POINTS—LOS ANGELES, DETROIT and NEW HAVEN

P. O. Box 1898  
New Haven 8, Conn.

4700 East 48th St.  
Los Angeles 58, Calif.

14341 Schaefer Highway  
Detroit 27, Michigan



Vol. VII

No. 4

JULY-AUGUST

★ ★ ★

Editor, C. E. HERINGTON  
Asst. Editor, Bus. Mgr.,  
H. R. HERINGTON

*Publication Committee*

*Chairman*, HORACE C. KNERR  
Metlab Company, Philadelphia, Penna.  
*Members*: LLOYD G. FIELD  
Greenman Steel Treating Company,  
Worcester, Massachusetts  
FRED HEINZELMAN, JR.  
Fred Heinzelman & Sons, N. Y. C.  
NORMAN HODGSON  
Alfred Heller Heat Treating Co., Inc.,  
New York City  
K. U. JENKS  
Lindberg Steel Treating Co.  
Melrose Park, Ill.  
MICHAEL KOBER  
Commercial Metal Treating, Inc.  
Bridgeport, Connecticut  
CHARLES R. WEIR  
Commonwealth Industries, Inc.  
Detroit, Michigan

*SALES REPRESENTATIVES*

*NEW ENGLAND:*

RICHARD BRINKERHOFF  
N. C. PETTIGREW  
73 Columbia Avenue  
Gaspee Plateau 5, Rhode Island  
HOplins 1-2725

*MICHIGAN:*

R. F. PICKRELL  
LARRY PICKRELL  
318 Stephenson Bldg.  
Detroit 2, Michigan  
TRinity 1-0790

*MID-WEST:*

ALFRED W. COLLIER  
116 S. Michigan Ave., Chicago 3, Ill.  
FIancial 6-1558

*WESTERN PENNSYLVANIA:*

ALEXANDER J. JOA  
Carlton House, Room 305  
Pittsburgh 19, Penna.  
ATlantic 1-6581

★ ★ ★

Published by the Metal Treating  
Institute, 271 North Avenue, New  
Rochelle, N. Y. Phone NE 6-4658.  
© 1956 by the Metal Treating Institute.  
All rights reserved.

The presentation of editorial material in "Metal  
Treating" should not be interpreted as either an  
endorsement or recommendation by the Metal  
Treating Institute of the statements set forth.

*Indexed in Engineering Index*



Member of Business Publications Audit  
of Circulation Inc.

JULY-AUGUST 1956

## EDITORIAL

### Help Now to Eliminate the Secondary Boycott

We have made it a practice not to use this page to express political ideas or any statements that might be construed as personal opinion. We therefore hope that our comments here and our publication of the article "The Secondary Boycott" on page 10 will not place us in the political arena.

However, because many of the plants of our readers have been subjected to or threatened by this illegal club, we want to avail ourselves of the opportunity to pass along some hope that conclusive action may be forthcoming against this practice.

The Chamber of Commerce of the United States in Washington has recently established a "Special Committee on Secondary Boycotts". They are now asking industry and industrial trade associations to compile and provide them with case history information about such boycotts. They plan to inform the American public about the costs and damages inflicted not only upon businesses but upon everyone by these methods.

If you have been a victim or know of others who have, notify the "Special Committee on Secondary Boycotts"—Chamber of Commerce of the United States, 1615 H Street, N.W., Washington 6, D. C. They'll use the information to help in their drive.

They also have published a 12-page booklet titled "Employer Rights in Secondary Boycotts," (price 10 cents). It provides helpful information about the present laws and points out its loopholes. It might help you to prevent or solve this problem.

*C. E. Herington*

## CONTENTS

Isothermal Heat Treating by V. H. Erickson .....	2
Induction Heat Treating by Thomas A. Dickinson .....	6
Blast Cleaning Department in Commercial Heat Treat Shop ....	8
The Secondary Boycott—An Interview .....	10
Heat Treating and the Smog Problem by S. Smith Griswold .....	14
Right or Wrong in Labor Relations .....	18
Abstracts .....	20
The Apprentice Corner .....	22
News to Heat Treaters .....	26
Institute News .....	32
Letters to the Editor .....	42
Manufacturers' Literature .....	44
Equipment & Materials Directory .....	47
Index to Advertisers .....	48

# ISOTHERMAL HEAT TREATING

By V. H. ERICKSON

Formerly, Chief Metallurgist,  
Allied Metal Treating Corp. Milwaukee, Wisc.

THE properties obtained by heat treatment are governed by the analysis of the material and the manner in which it is treated. By the time the material reaches the stage of heat treatment, there is very little, if anything, can be done about the analysis of the parts. It is therefore necessary to control the heat treatment to as close limits as possible to obtain the desired results.

This discussion is not intended to expound any new methods or theories. It is written with the hope that it may clarify some of the procedures in general use. Diagrams used are the same that appear in various articles and they are used with very little change for the purpose of clarity. Time, temperature, and transformation, or commonly called TTT diagrams, have been in general use for a long time. The information on the regular diagrams is concise, accurate, and dependable.

The commercial heat treater is often confronted with requests on treatment that are practically impossible to deliver. This, in main, is due to lack of understanding on the part of the customer. Invariably, the customer has read some of the virtues of Isothermal treatment but has not been able to grasp the full meaning. It is hoped that this will be received in the spirit in which it is intended.

Isothermal treatments have limitations beyond conventional methods and until these are recognized by all concerned, we will continue to have difficulties. The various methods of Isothermal treatments will be dealt with separately and compared with the conventional method.

## ***Isothermal Annealing***

Annealing is a term applied to heating and cooling, usually to induce softening. If other things are desired, further terminology should be applied because to say "Anneal" usually is taken to mean full anneal. Not too long ago the main criterion for machinability was hardness, and material was usually bought to a specified range of hardness to meet the machining demands. The machine operators soon noticed that like materials in the same hardness range machined differ-

ently. This brought on a microscopic study to determine why. Structure was found to be of equal importance to hardness in the machining picture, so logically there followed controlled structure. Isothermal, or cycle annealing was found to be the answer for controlling structure.

Conventional annealing requires heating into the austenitizing range; hold long enough to be in complete solution; and then slow cool or commonly called "furnace cool."

Isothermal annealing requires heating into the austenitizing range; hold long enough to be in complete solution; then cool rapidly to some point in the upper portion of the transformation diagram; hold long enough to complete the transformation, and then cool. The point of stopping the rapid cool and holding is dependent upon the material being transformed. In most cases the holding time is of such duration that time is actually less in this method of annealing; yet the controlled structure machinability is increased. For the purpose of comparison, the diagrams of the two methods are placed together. A large percentage of the tonnage being used on automatic screw machines today is annealed in this manner. (See Figs. 1 and 2).

## ***Austempering***

The process of austempering was developed by a metallurgist of U.S. Steel. It brought to light a new constituent named for the man who helped discover it—"Bainite." This constituent is stable as formed, and unlike martensite, it etches dark before draw. The treatment is accomplished by heating into the austenitizing range; cooling rapidly enough to miss the nose of the "S" curve to a point above the martensite forming range; and holding long enough for transformation to be completed. The hardness obtainable varies with different analysis, but in most cases it is slightly lower than can be obtained by conventional methods. The ductility at a given hardness is greatly increased. Impact values are improved, and sheer values remain about the same. The end product is Bainite which is formed at temperatures above the martensite forming range. Therefore, there is much less internal



stress and distortion. No tempering is necessary if the proper location on the "S" curve was picked for the transformation. This also cuts down the possibility of further distortion.

Austempering is probably one of the least under-

By comparing the schematic charts for austempering and conventional treatment, one can readily see the different end results obtainable. Good, uniform agitation is very essential in the quench salt. Even with the best facilities, it is well to stay down to  $\frac{1}{4}$ " sec-

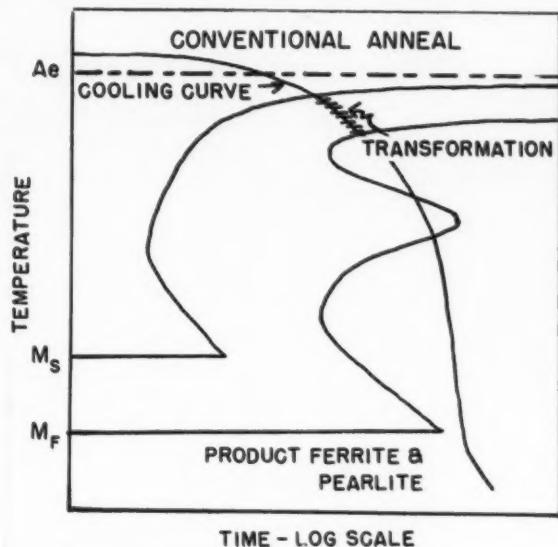


Figure No. 1

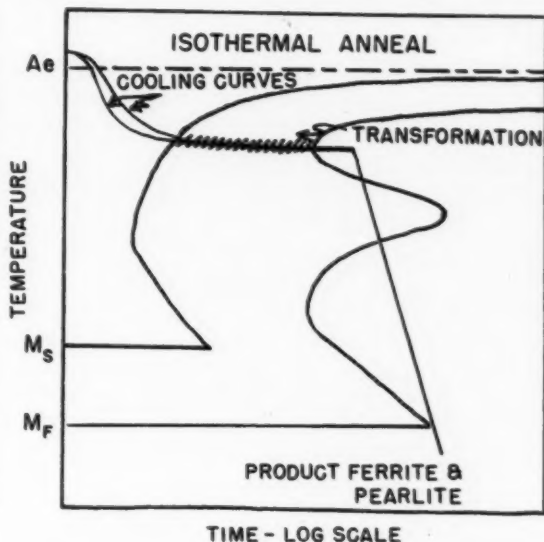


Figure No. 2

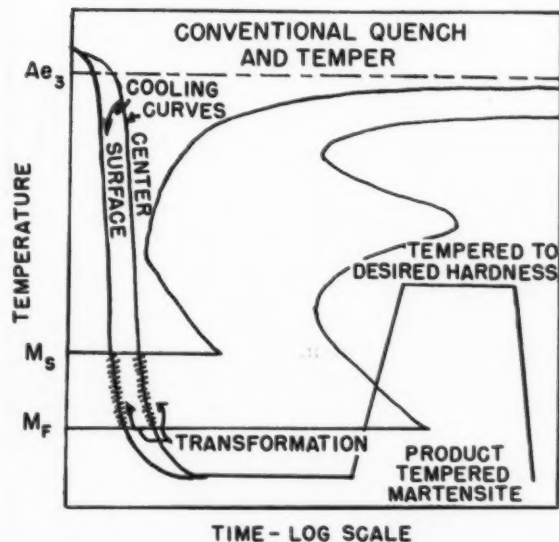


Figure No. 3

stood processes used today. Results that can be attained in light section cannot be duplicated in heavy section, and parts that are not uniform in section will not respond evenly. It was never intended to be a cure-all, but many firms today are asking for this treatment on parts that are not suitable for the treatment, and then when the results are spotty the treatment gets the blame. Heat treaters should be the first to recognize this error and make recommendations accordingly.

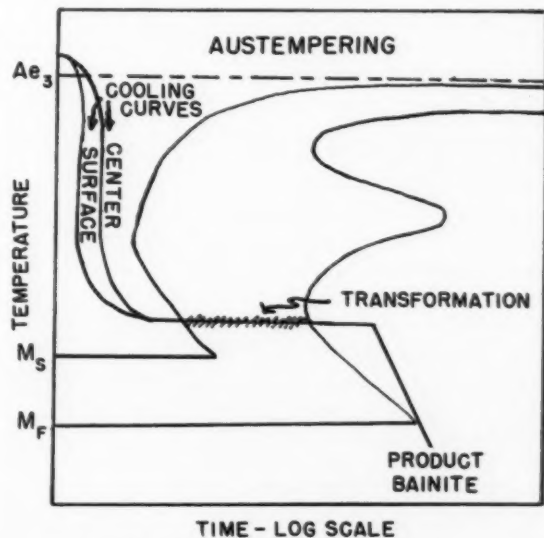


Figure No. 4

tions for uniform results. This limits the types of jobs that can be successfully treated. A few parts as heavy as  $\frac{3}{8}$ " have been done, but the results are not uniform.

### Martempering

For purposes of comparison the charts for austempering and martempering have been placed together. (See Figs. 3 and 4). So many times these operations

are confused. In this operation the limitations are not so great and much greater volume can be expected. The treatment is accomplished by heating into the austenitizing range, quench fast enough to miss the nose of the "S" curve, but the quench bath must be held at a temperature high enough to be just above the temperature where martensite starts to form. Parts are held at this temperature long enough to uniform out center and surface, but not long enough for

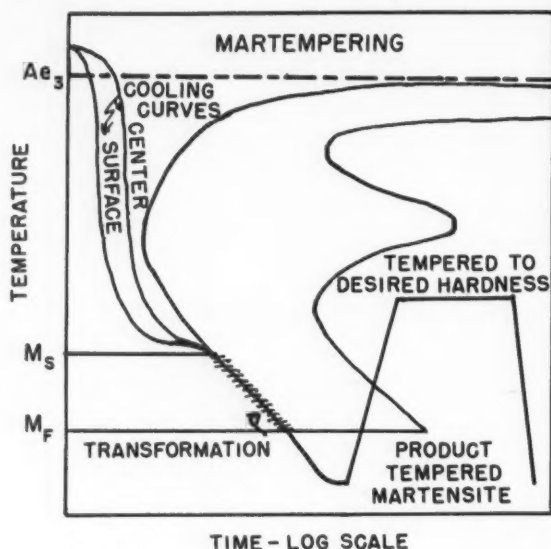


Figure No. 5

transformation to Bainite to start. Then they are air cooled and tempered to required hardness. The only size limitation in this treatment is governed by the cooling rate. If the time to uniform is greater than the time for Bainite to start, full hardness will not be attained. The end products are the same as conventionally treated parts, but having center and outside uniform there is considerably less internal stress and distortion. This in turn cuts down the probability of cracking. The quench bath for this treatment is usually salt. There are several oils on the market also, but the top recommended temperature at which they can be safely operated is such that it limits their use to very few materials. It has been our observation that very few parts are truly martempered.

#### Modified Martempering

By comparing the chart for modified martempering with those for austempering and martempering it will become apparent that modifications would happen either by design or chance. (See Figs. 5 and 6). The writer conducted microscopic examination of parts quenched as close to the " $M_s$ " point as possible. By stepping both ways one could begin to draw a definite pattern. Quenched just above the " $M_s$ ", Bainite

was formed as would be expected, but just below the " $M_s$ " there seemed to be a combination of constituents. Microscopic examination before draw indicated a fair percentage of Bainite. As the quench temperature was lowered, the percentage dropped accordingly until we reached the location of " $M_{50}$ ". From there on down we could detect no Bainite.

The September issue of *Metals Technology*, 1947, contained an article by Howard & Cohen, which indi-

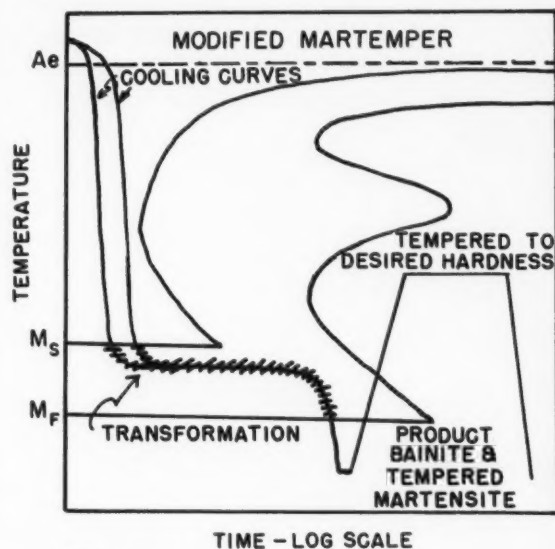


Figure No. 6

cated a coexistence of Bainite and martensite. The rate of nucleation seems to be an important factor. Quenched high enough to slow the action, Bainite will form. This has a profound effect on the physicals. Impact values have a marked increase, ductility is high, and distortion is again cut considerably. It would appear that any of the hot quench methods will drop the distortion.

Modified martemper imposes many of the same limitations that are present with austempering and martempering. The " $M_s$ " point in many steels is in excess of 500°F. so that we are limited to molten salt as a quenching medium. The greatest change is in sizes that can be treated. Parts that have 1½" sections are treated with success. Hardness values are increased slightly over martemper and are considerably higher than austemper, especially in light sections.

The possibilities for the modified method are many, and only slight changes in procedure can vary the end result considerably. It is our belief that many of the treatments now listed as martemper are actually being treated under the modified method. Investigators have neglected the low temperature field, and consequently there is very little published data. The trial and error method is slow and sometimes expensive — but sure. ■ ■ ■

# Carbonitriding with Armour Ammonia

*is cleaner, safer,  
more economical  
than carburizing  
or liquid cyaniding!*



**CLIP AND MAIL THIS TODAY!**

Reduces distortion, imparts resistance to rusting and corrosion, produces cases of outstanding uniformity!

Carbonitriding results in a minimum of distortion because it permits lower operating temperatures and less severe quenching. The increased hardness it produces offers greater resistance to rusting and corrosion, and often permits substitution of plain carbon for alloy steels.

Carbonitriding is readily adaptable to mass production methods. Lower operating temperatures reduce furnace maintenance costs. Simplified washing and cleaning operations make working conditions cleaner and safer.

Our Technical Service Department is equipped to handle and answer any problems arising with ammonia installations for metal treating. Send today for free booklets offered at right. If your problems are unusual or pressing, write, giving full details.



Save money on our tank truck delivery service!

Please send me free booklets which I have checked:

- ☐ "Ammonia Cylinder Installations for Metal Treating"
- ☐ "The Role of Water Vapor and Ammonia in Case Hardening Atmospheres"
- ☐ "Case Hardening of Steel by Nitriding"
- ☐ "A Survey of Industrial Carbonitriding Practice"
- ☐ "Investigation into the Carbonitriding of Plain Carbon Steel"
- ☐ "The Carbonitriding of Alloy Steels"
- ☐ Tank truck service information

Name \_\_\_\_\_ Title \_\_\_\_\_

Firm \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

T7

**ARMOUR**

*Ammonia Division*

Armour and Company • 1355 West 31st Street • Chicago 9, Ill.

# INDUCTION HEAT TREATING

By THOMAS A. DICKINSON

West Coast Reporter

**W**HILE they handle about 90% of the induction heat treating work that is now being done in Southern California, officials of Cook Induction Heating Company—a 10-year-old firm at Maywood, Calif.—are quick to point out that induction processing is not the only answer to the metal treater's heating problems.

"It is a supplement to conventional heating methods," says Richard S. Smith, Sr., owner of the company. "In our case, it has the supreme virtue of enabling us to handle many jobs that other heat treaters in Southern California are unprepared for. However, we also make extensive use of standard furnaces and torch heating facilities."

Induction heating in the Maywood plant consists briefly of inserting ferrous and nonferrous metal parts in coils energized with high-frequency current so as to elevate temperatures with magnetic lines of force. This is not the only induction heating method, but it appears to be the technique that is most suitable for metal treating applications.

During the past ten years, Cook has made use of three Thermionic induction generators and over a thousand induction coils—most of which were designed and fabricated by company personnel for special heating jobs—and, in general, the firm's officials have found that induction heat treating is desirable when:

(a) Localized hardening or annealing is indicated—for instance, where a cutting tool should have an extremely hard tip and a relatively soft shank for maximum longevity.

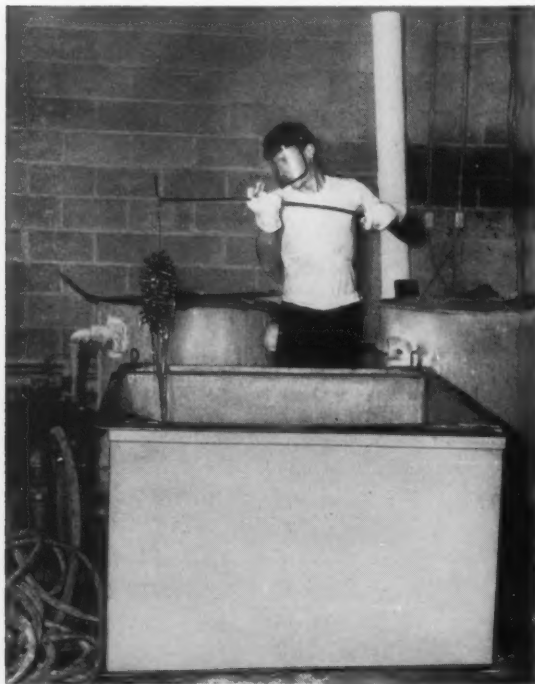
(b) Thickness of case must be maintained with relative precision in order to retain the original ductility of a core.

(c) The time required to treat individual parts should be minimized.

(d) Distortion problems due to overall heating can be eliminated.

(e) Scale due to oxidation should be minimized.

The above conditions do not emphasize the production importance of induction heating because that is not an invariable advantage. For example, while it



A worker at Cook Induction Heating Company of Maywood, Calif. removes a batch of heat treated parts from an oil quenching bath.



This is the smallest of two furnaces used in treating metal products.





A rotary table with gas torch heating facilities is used to braze small parts.

may be used to treat a few steel components in a matter of minutes where hours would otherwise be required, induction heating is not the fastest method of treating several hundred or several thousand identical parts because the latter would have to be inserted in an induction coil one at a time—whereas a furnace might handle the entire batch of parts as a single charge.

On the other hand, induction heating is the only effective production method—regardless of quantity requirements—where overall heating is contraindicated and optimum precision is specified. For example, where overall furnace heating once caused many rejections due to distortions, induction heating has lowered production costs by margins ranging to more than 75% by making it possible to harden limited component areas—such as gear and bearing surfaces on engine parts—so as to eliminate warpage.

Some localized heat treatments can of course be satisfactorily performed with gas torches, but that at best isn't a very precise method of utilizing heat. And in work with some materials such as titanium, it can cause excessive oxidation.

Even when it is done in open air, induction heating tends to minimize oxidation because it is extremely rapid and involves no use of oxygen to support combustion; and, since it can be accomplished in a vacuum chamber with a completely inert atmosphere, it is one of the few heating methods that makes the elimination of oxidation practical.

Most of the materials now being processed in Cook's 4000-sq. ft. plant are brasses, bronzes, and steels (especially, carbon and stainless steels) of the types used by the aircraft, oil tool, appliance, plumbing, and screw machine industries. No aluminum is treated, because the heating of aluminum and ferrous materials with identical facilities would be impractical.

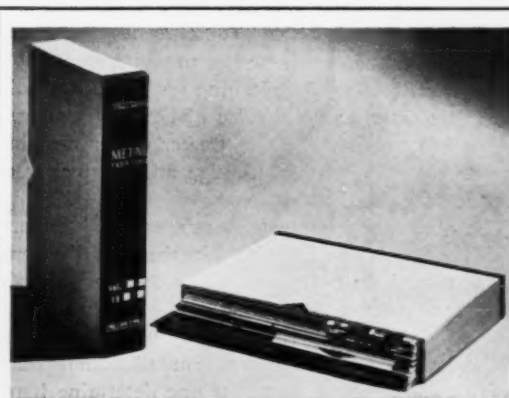
In addition to the aforementioned induction units, the company has a complete heat treating plant for



Bearing surfaces on a small steel part are heat treated in an induction coil.

the core treatment of parts which are to be induction hardened, facilities for pack and liquid carburizing, and a number of special oxy-acetylene heating rigs—including a pair of rotary tables.

The oxy-acetylene rigs are used largely as supplements to the induction units for brazing operations because many continuous and silver brazing jobs can be completed more efficiently with gas heat than with induction heat. ■ ■ ■



## BUILD YOUR LIBRARY OF METAL TREATING WITH THESE VOLUME FILES

Old copies of METAL TREATING are at a premium. Many readers are using various means to preserve their copies. Here is an attractive, inexpensive, dustproof file especially designed to hold 12 copies (two years) of METAL TREATING. Dig your old copies out of the file and start saving the current ones now. These handsome, gold-lettered, maroon and bright yellow volumes will brighten your bookshelf and assure you an intact, clean, and orderly library of METAL TREATING. Shipped postpaid for \$2.50 each, 3 for \$7.00, 6 for \$13.00. Send check to:

**METAL TREATING**  
271 North Avenue  
New Rochelle, New York



## **BLAST CLEANING DEPARTMENT IN COMMERCIAL HEAT TREAT SHOP**

**H**EA T treated parts need to be cleaned before further operations such as Magnaflux, Magnaglo, machining, and grinding can be done. Cleaning can be done either in the heat treat shop or the customer's plant.

But many commercial heat treating shops have installed cleaning departments to give their customers this added service. Besides added convenience and service to the customers, greater profits are available to the heat treater. The cleaning service can be sold to the customer, and the price of the operation can be justified to him. The heat treater with a cleaning department gains also in prestige and in quality of work leaving the shop.

The abrasive blast cleaning process has been one of the most successful methods in these applications. It is automatic in operation, free from disposal problems, and speedy. An example of quality control obtainable is that blast cleaning of parts before nitriding makes possible uniform nitriding. Blast cleaning of hardened parts lets one determine hardness patterns. Depth of hardness of, say, gear teeth or cam lobes can be checked visually. Blast cleaning helps to make sure that only correctly hardened or annealed work goes out of the shop.

Most customers of a commercial treating shop have an insufficient volume of work to justify investing in a really efficient cleaning department of their own. The cost of equipment, plant space, and operating labor becomes excessive for the limited amount of work they have. They tend to settle for less efficient cleaning, because of cost.

But the commercial heat treater, having work from many customers, can easily amortize an efficient cleaning department over the total work volume. Charges for, say, job blast cleaning would compare favorably



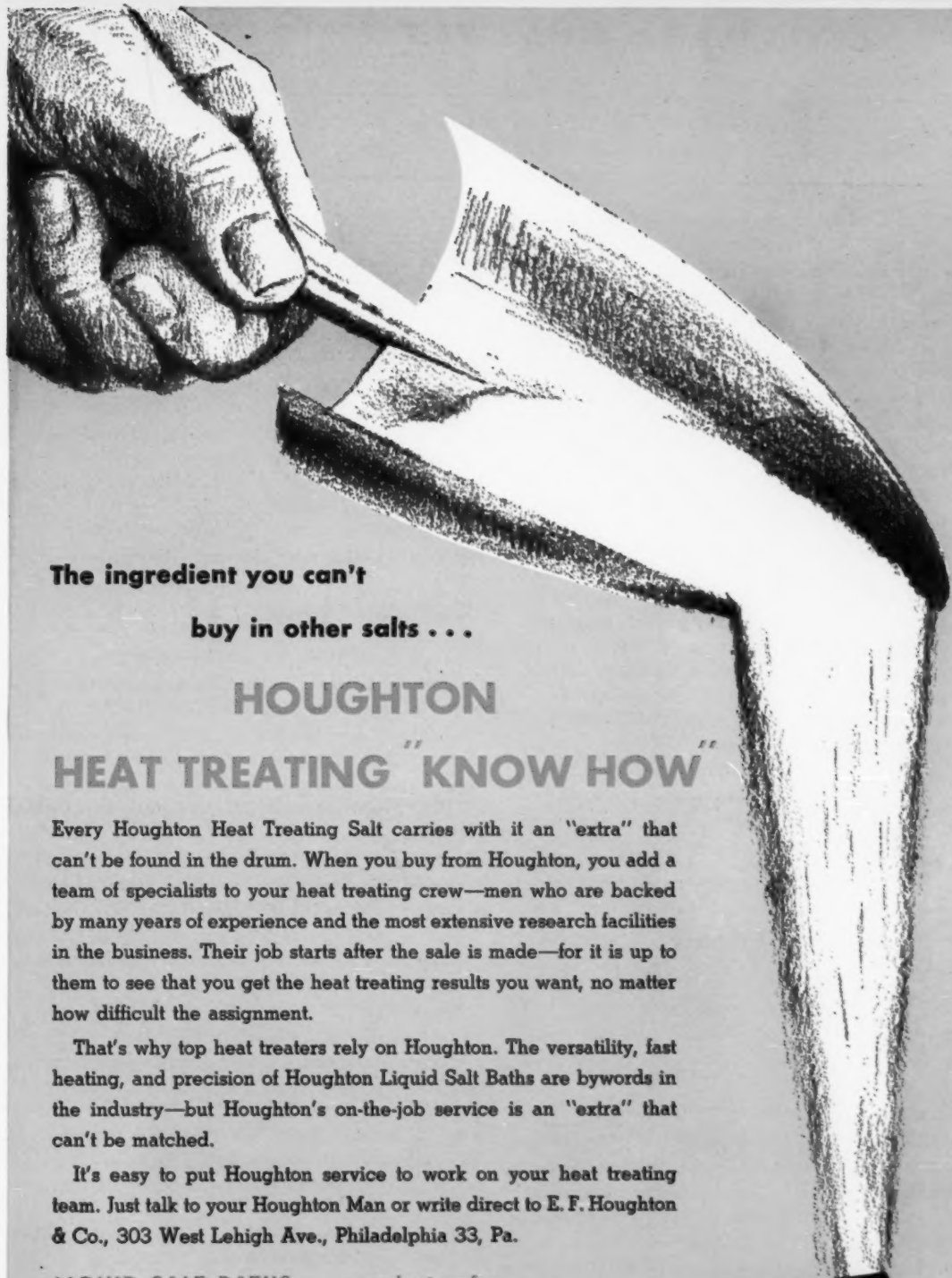
Fig. 1—View of the job blast cleaning department at Perfection Tool & Metal Heat Treating Company, Chicago, Illinois. Picture shows four Wheelabrator Corporation airless abrasive blast cleaners. Also used but not visible is a wet blast cleaning machine.



Fig. 2—One of two Wheelabrator Tumblast blast cleaners at Calumet Heat Treating Company, Chicago. Here we see automatic unloading of cleaned bearing forgings from the blasting compartment.

with those for less efficient methods in the customer's plant.

The "free sample" method has been very successful in selling job cleaning to customers. The heat treater takes a customer's normal heat treat order and returns half of the parts in the usual scale-covered condition and half of them in the cleaned condition. This is a remarkably effective way of advertising the service and letting the customer prove to himself the advantages of purchasing it. ■ ■ ■



The ingredient you can't  
buy in other salts . . .

## HOUGHTON HEAT TREATING "KNOW HOW"

Every Houghton Heat Treating Salt carries with it an "extra" that can't be found in the drum. When you buy from Houghton, you add a team of specialists to your heat treating crew—men who are backed by many years of experience and the most extensive research facilities in the business. Their job starts after the sale is made—for it is up to them to see that you get the heat treating results you want, no matter how difficult the assignment.

That's why top heat treaters rely on Houghton. The versatility, fast heating, and precision of Houghton Liquid Salt Baths are bywords in the industry—but Houghton's on-the-job service is an "extra" that can't be matched.

It's easy to put Houghton service to work on your heat treating team. Just talk to your Houghton Man or write direct to E. F. Houghton & Co., 303 West Lehigh Ave., Philadelphia 33, Pa.

LIQUID SALT BATHS . . . products of

**E. F. HOUGHTON & CO.**  
PHILADELPHIA • CHICAGO • DETROIT • SAN FRANCISCO



Ready to give you  
on-the-job service . . .

# THE SECONDARY BOYCOTT

*An interview with Mr. Hoyt P. Steele, President, Benjamin Electric Manufacturing Co., Des Plaines, Ill., and Chairman, National Chamber of Commerce Special Committee on Secondary Boycotts.*

## **Can You Cite Some Examples of Secondary Boycotts?**

I certainly can. For a very simple one, let's take a non-union truck company. A union attempts to organize the employees of that trucker, but it fails. The union business agent with a great big badge goes to a loading dock at a transfer point, and he assembles all the union drivers of other connecting lines for a speech. He urges them to refuse to handle any freight that comes off the trucks of this non-union trucker. The union drivers then refuse to handle the freight. That in its simplest form is clearly an illegal secondary boycott under the provisions of Taft-Hartley.

But all this effort isn't necessary. The business agent doesn't have to go directly to the employees of the connecting truck lines. All he needs to do, even by telephone, is to go to the owner of the connecting truck line or to a superintendent on the loading dock and simply threaten that if they handle the freight of this non-union trucker, there will be trouble. This is a secondary boycott, but the National Labor Relations Board says this type is not illegal.

## **Those Were Hypothetical Cases, Do You Have Any Real Ones?**

Yes, there are scores of them. Our Chamber of Commerce Special Committee on Secondary Boycotts has a file of them. Perhaps you will recall the secondary boycott the auto workers imposed against the Kohler Co. of Kohler, Wisconsin, last year. The union through a secondary boycott blocked the arrival and unloading of two ships carrying clay from England destined for Kohler. When one of the ships tried to land at Milwaukee, the city officials refused to guarantee its safety.

In Erie, Pennsylvania, the H. Platt Company was the general contractor on a Ford agency garage and showroom. They subcontracted the heating system work to the Felheim Heating & Roofing Company, whose employees were represented by the AFL machinists. Although this union was certified by the National Labor Relations Board, the sheet metal workers placed a picket on the job and imposed a secondary boycott against Platt and the other subcontractors. After four weeks, the NLRB granted relief, but this loss of good construction weather made it impossible to complete the project on schedule.

The New Castle County, Delaware, airport was picketed and work held up for five months because

county officials gave the electrical contract to the lowest bidder. The contractor's men preferred not to join the union, but the electrical workers union used a secondary boycott in an attempt to organize them "from the top."

In another instance, Los Angeles carpenters refused to install kitchen cabinets in 3,295 new homes because the cabinets did not have a union label. An investigation revealed that the cabinets were made in Dubuque, Iowa, by Carr, Adams and Collier, and that 94 per cent of their employees were union members. But that didn't make any difference to the carpenters in California.

## **Have You Had Any Personal Experience With Secondary Boycotts?**

For the past 10 years my company, the Benjamin Electric Manufacturing Co. of Des Plaines, Ill., has been a continual victim. We are virtually excluded from doing business in St. Louis, Kansas City, and Minneapolis because of secondary boycott threats. The threats are made to electrical contractors, and they are afraid to order our equipment.

## **Do Your Employees, Mr. Steele, Belong to a Union?**

Yes. More than 85 percent of our employees are members of the AFL International Brotherhood of Electrical Workers union; yet, this same union frequently refuses to install Benjamin Electric products.

## **Why Do You Object So Strongly to Using a Union Label?**

Because, if you think about it, the purpose of a union label is fundamentally wrong. At least where a non-consumer product is concerned a union label is nothing more nor less than an instrument of a secondary boycott or a potential boycott. What other useful purpose can it possibly serve? It is simply a ticket to give clearance for installation in areas where the union is trying to enforce monopolistic control.

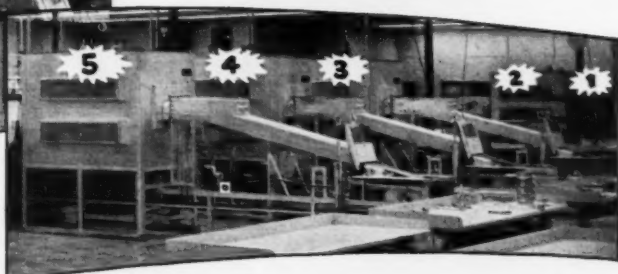
## **Why Do You Think the Unions Insist Upon a Label?**

There are two main reasons — to organize more workmen and to achieve greater economic power. In our case, organization is not the purpose because 85 percent of our employees are in the union. Unions are anxious to control local markets in metropolitan areas. For example in the building trades, the electrical workers union cannot very well go around and persuade by word of mouth or by use of lists and convince electricians to refuse to use or install certain

# 7 Furnaces at SPERRY RAND



In the Sperry Electronic Tube Division of SPERRY RAND, Gainesville, Florida, a battery of 7 Sargeant & Wilbur furnaces perform faithfully and economically, aiding in the production of klystron tubes.



## Representatives

**STRONG ENGINEERING, INC.**

Keith M. Strong and  
Allen Repp  
8109 South Telegraph Road  
Taylor Center, Dearborn,  
Michigan

**ACME INDUSTRIAL  
FURNACE & EQUIPMENT  
CO.**

Roger Building  
Cincinnati 37, Ohio  
**EDWIN A. WERT**  
1828 No. Alexandria Ave.  
Los Angeles 27, Calif.

**ROY M. JAHNEL**  
Suite 502  
1025 Connecticut Ave., N.W.  
Washington, D. C.

**STOUT & LOMAN**  
712 West Sycamore St.  
Kokomo, Indiana

**JOHN FIGNER CO.**  
1123 La Clair Avenue  
Regent Square  
Pittsburgh 18, Pa.

**WILLIAM D. PRICE**  
611 Ann St., Box 414  
Monroe, No. Carolina

**T. C. JARRETT COMPANY**  
95 So. Ammons St.  
Denver 15, Colorado

**GERALD B. DUFF & CO.**  
George Ewing and  
William Eckhard  
2165 Morris Avenue  
Union, N. J.

**WILLIAM G. PRAED**  
416 No. State St.  
Chicago 10, Illinois

**MARSHALL C. BATTEY**  
180 Weeden Street  
Pawtucket, R. I.

**CRESTMONT PRODUCTS,  
LTD.**

45 Hollinger Road  
Toronto 16, Ontario, Canada

**EXPORT DEPARTMENT**  
P. O. Box 1896  
New Haven, Conn.

● Five S&W Conveyor Furnaces with 15" belts are used for silver and copper brazing of klystron tube components, as well as for degassifying and oxidizing.

Two S&W Pusher Furnaces are used primarily for brazing operations.

Atmosphere is dissociated ammonia, produced from two 2,000 CFH S&W Ammonia Dissociators.

Purging atmosphere is supplied by a 1500 CFH Forming Gas Generator. This atmosphere is dried by an automatic, activated alumina dryer.

*Write today for literature—and state your problem. Our staff of engineers is ready to advise without obligation.*



**SARGEANT & WILBUR, INC.**  
185 Weeden St., Pawtucket, R. I.

*Complete Line of Electric and Fuel Fired Heat Treating  
Equipment • Furnaces • Generators • Ammonia Dissociators  
Gas Conditioning Equipment • Accessories*



**NO. 5** in a series of **ALUMICOAT APPLICATIONS**

**For HIGH TEMPERATURE APPLICATIONS**



*Alumicoat*

**Molten Aluminum  
PROCESS**

**CAN PROTECT HEAT TREATING EQUIPMENT  
FROM CORROSION & HEAT OXIDATION!**

The new, ALUMICOAT molten aluminum Process has been perfected to give steels added resistance to corrosion and heat oxidation where continuous high temperatures are a problem.

In the ALUMICOAT Process, heat treating fixtures, trays, etc., are dipped in molten aluminum to produce a metallurgical iron-aluminum bond at the interface and a surface overlay of pure aluminum. At temperatures exceeding the melting point of aluminum, the aluminum on the surface diffuses. This diffused coating, together with the iron-aluminum bond, provides a refractory material that gives steel maximum protection against high temperature scaling.

The ALUMICOAT Process can give you greater economies through the use of lighter yet more rugged fixtures with a longer life through added resistance to corrosion and heat oxidation!

Send for full details. Your inquiry is invited.

**ARTHUR TICKLE ENGINEERING WORKS, INC.**

29 Delevan Street

MAIn 5-4200

Brooklyn, N. Y.

products. So the union label is the sign-board which identifies the acceptable product automatically. It provides a safe passage through the mine fields of threatened trouble.

**What's the Economic Effect of Secondary Boycotts?**

The first effect is a monetary loss to everyone. Although studies now are underway by our Secondary Boycott Committee, it is difficult to evaluate the cost because of the great variety of boycotts and because we have lived with boycott examples for so long, it is now sometimes hard to recognize them. For instance, let's take the glaziers' union ban on the use of pre-glazed window sashes. Figures show that it cost from \$50 to \$80 a house to glaze windows on the job rather than at the factory. Builders estimate about 1,000,000 new homes this year, and at \$50 a home for windows, the cost is staggering. Now add the cost of bans on roller and spray painting. Also include restrictions imposed in some areas on certain pipe material or on prefabricated homes. Then add the numerous other make-work practices, enforced through secondary boycotts. You will find the cost truly amazing. Everyone is affected.

**Is Money the Only Effect of Boycott Tactics?**

No. There is an even greater cost — the loss of freedom of choice. Our competitive free enterprise system has given us a range of products and services to choose from in the market place that is the envy of the world. Any limitation of our freedom of choice is a serious attack upon our economic system and should be vigorously fought by businessmen and the public everywhere. Let me give you an example of how a firm in Akron, Ohio, with CIO workmen was forced out of the market of bidding for ventilating equipment on a West Virginia project. AFL sheet metal workers advised in advance they would not install CIO made ventilators. The fact that the Ohio ventilators may have been a superior product was immaterial; thus, the customer's freedom of choice was lessened.

**Well, How Do Boycotts Get Started?**

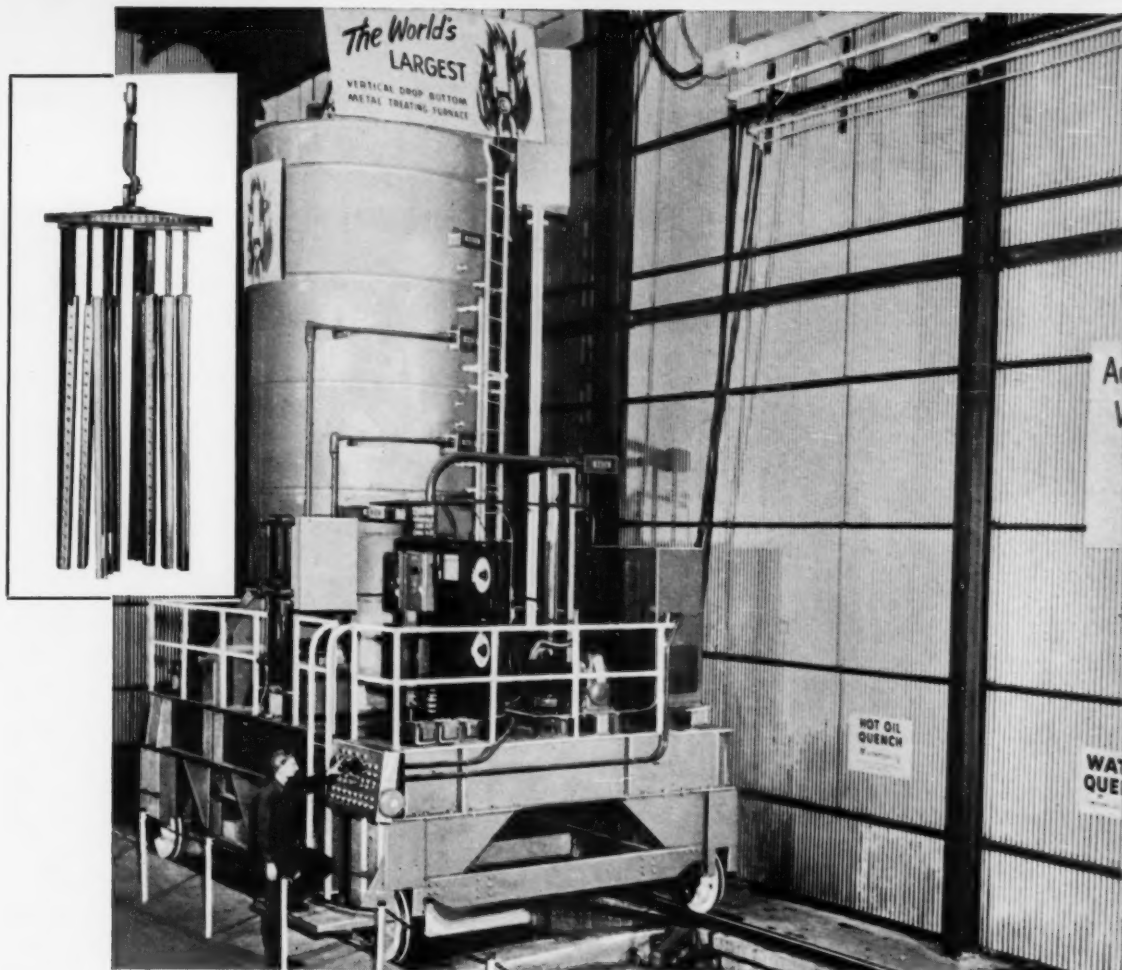
I believe that in those industries where boycotts are actively enforced today they started in every case with the agreement by some employers who believed some commercial benefit would be gained by 'going along' with a union's demand to stop doing business with some other employer.

**Earlier You Cited Examples of Legal and Illegal Boycotts? Aren't They All Against the Law?**

Well, in August, 1947, after the passage of Taft-Hartley, many of us thought that all secondary boycotts were made illegal. That happy illusion didn't last long. Loopholes were soon discovered and interpretations by the National Labor Relations Board legalized other boycotts so today they flourish in many industries and a great potential danger exists in others.

*(Continued on page 41)*





Inconel work-holding fixture is used in this giant drop bottom metal-treating furnace, installed at Metallurgi-

cal, Inc., Minneapolis, Minn. Loftus Engineering Corporation designed and fabricated the furnace.

## Giant Fixture for Giant Furnace... hot strength of Inconel keeps it warp-free

Look at this Inconel® nickel-chromium alloy workholder (inset).

It's more than seven feet in diameter. Suspends extra long, extra heavy, steel and aluminum parts vertically during heat-treatment. And also during the quench in oil, water, or hot salt.

The furnace hardens, anneals, stress relieves, and normalizes. In controlled endothermic or neutralene atmospheres. At temperatures up to 2200°F. Despite all this, the Inconel alloy fixture has resisted corrosive attack, cracking, and warping more than a year. In fact, it looks almost new.

That's because Inconel alloy has unusual "hot" strength, withstands thermal shock, and maintains resistance to oxidation up to 2100°F. It also resists carburization and many other forms of attack by heat-treating atmospheres.

What's more, Inconel alloy is readily fabricated, easy to weld. Specify Inconel next time you need a fixture to withstand severe conditions.

\*Registered Trademark

Equipment pictures available — Complete data on the use of Inconel at high temperatures is covered in picture-packed Inco booklet, "Keep Operating Costs Down When Temperatures Go Up." Write for a copy, today.

THE INTERNATIONAL NICKEL COMPANY, INC.  
67 Wall Street New York 5, N. Y.



Nickel Alloys

**Inconel**

... for long life at high temperatures

# HEAT TREATING AND THE SMOG PROBLEM

By S. SMITH GRISWOLD

Air Pollution Control Officer  
Los Angeles, Calif.

**P**OLLUTION of the atmosphere, by-product of our increasingly complex industrial economy, is rapidly becoming a serious national problem. That fact was recognized last June by Congress when it authorized a \$25 million, five-year study of air pollution.

Many major American cities faced and solved the problem years ago by passing anti-smoke and dust laws. In Los Angeles County, where air pollution has achieved international notoriety in recent years, it is a complex and unsolved problem affecting over five million residents and over 15,000 industries, third largest such concentration in the United States.

Heat treating plants, while only a minor source of industrial pollution, are nevertheless required to conform to certain air pollution laws. Lessons learned by heat treaters in meeting regulations of the Los Angeles County Air Pollution Control District can be of use to other plants, however, regardless of their location or relative contribution to what is loosely termed "smog."

Los Angeles smog is actually a mixture of over 50 identified pollutants thrown off by industry, business and domestic activities. Low velocity winds, a temperature inversion and Southern California's famed sunshine all combine to produce eye-smarting, crop-damaging smog on approximately 70 days of each year.

In most other industrial areas, winds are of sufficient velocity to sweep away air contaminants before they reach irritating concentrations. Also, temperature inversions usually don't exist, or else remain at much higher altitudes than in Los Angeles, where they sometimes drop below 600 feet. Pollutants over Los Angeles are thus trapped in cooler ground air and held there by the warmer blanket of inversion air.

Sunshine, responsible for producing millions of dollars annually in tourist trade, also produces a photo-chemical reaction between certain pollutants to create literally a "factory" in the sky, where additional smog is produced. Dr. A. J. Haagen-Smit, California Institute of Technology scientist, discovered this smog peculiarity in 1950 when he produced artificial smog in a plastic chamber.

Main ingredients in the catalytic process are hydrocarbons, or gasoline vapor; ozone, and nitrogen dioxide, which is given off in all burning or combustion processes.

Major emphasis in control of pollutant emissions from heat treaters is on smoke created by introduc-

tion of oily parts into furnaces. Smoke emissions of density over prescribed limits for periods exceeding three minutes in any one hour can result in a citation to court and a heavy fine. Several plants have been cited in the past when careless operators shoved trays of oil-coated parts into furnaces.

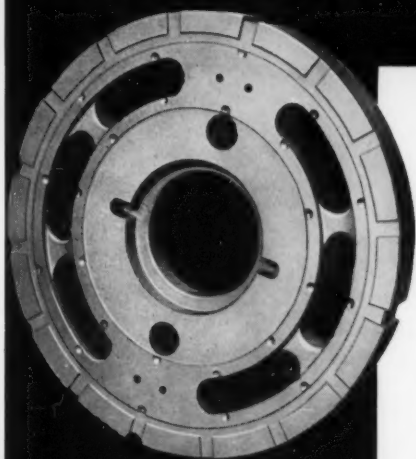


Fig. 1—Basket of parts for rock bits is lowered into perchlorethylene de-greaser at Security Engineering Division, Whittier, Calif. Operation is required by Los Angeles County Air Pollution Control District to prevent smoke emission on introduction into furnace for heat treating.

Smoke regulations are not the only tool used by the Air Pollution Control District in its control program. Under a nuisance regulation, uniformed inspectors can cite firms for emitting "... quantities of air contaminants or other material which may cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public, or which endanger (their) comfort, repose, health or safety, or which cause or have a natural tendency to cause injury or damage to business or property."

In large salt bath carburizing operations, for example, some firms are required to install covers to

# SALT BATH HEAT TREATING Eliminates Atmosphere Problems



## TYPICAL!

This Vasco B.B. steel valve plate was a heat treater's "nightmare"—until Ajax salt baths were put on the job. Under conventional heating methods, plates invariably cracked and hardness response was only Rc 52. Martempering and drawing in Ajax baths produced Rc 60-64 . . . without cracks, warping or surface defects.

## Good-bye to scale and decarb!

All air is "sealed out" by the molten salt! Parts come from an Ajax salt bath furnace clean and scale free. There is no pitting. Even when parts are transferred from one bath to another, a film of molten salt clings to parts, protects them fully to the instant of quenching. Scale and decarb are avoided.

Other Ajax salt bath advantages include: Distortion is held to a negligible minimum. Outstandingly uniform heating because electrodynamic stirring action maintains even

temperatures in all parts of the bath. Costly finish grinding or straightening after heating is either greatly reduced or eliminated.

25<sup>th</sup>  
YEAR

## MAIL COUPON FOR CASE HISTORY BULLETINS

# AJAX

HULTGREN

electric SALT BATH furnaces

Cost-savers for . . . practically any heat treatment  
. . . practically any alloy.

### ASSOCIATE COMPANIES:

Ajax Electrothermic Corp., Trenton, N. J.

—High-frequency induction furnaces

Ajax Electric Furnace Corp., Phila., Pa. —Low frequency

Ajax Engineering Corp., Trenton, N. J. —Induction furnaces

### AJAX ELECTRIC COMPANY,

940 Frankford Avenue

Philadelphia 23, Pa.

Send actual Case History Data on applications checked:

- |  |  |
|--|--|
| <input type="checkbox"/> Austempering—Martempering | <input type="checkbox"/> Carburizing, Cyaniding    |
| <input type="checkbox"/> Annealing                 | <input type="checkbox"/> Hardening                 |
| <input type="checkbox"/> Brazing                   | <input type="checkbox"/> Cleaning, Descaling, etc. |

☐ Other ☐ \_\_\_\_\_

☐ Check here for free HEATING TIME CALCULATOR for salt baths.

Name \_\_\_\_\_ Position \_\_\_\_\_

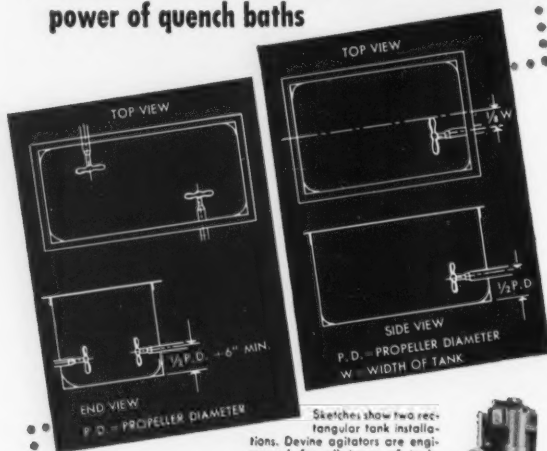
Firm \_\_\_\_\_

Address \_\_\_\_\_

# Devine Agitators

*improve Quenching*

..by greatly increasing the heat extracting power of quench baths



## Agitation Improves Quality...

INCREASED TENSILE STRENGTH  
INCREASED YIELD STRENGTH  
GREATER DEPTH OF HARDNESS  
UNIFORM MICROSTRUCTURE

Devine agitators are sturdy, compact, self-contained . . . Easy to install, detach and maintain. They speed up quenching, improve the quality of steel and machinability of products. Consult Devine about the correct number, size, type and positioning of agitators for your tanks, quenchants, and specific requirements.



MT2

**J. P. DEVINE MFG. CO.**

A. M. Cox, President

49th Street and A.V.R.R. Pittsburgh 1, Pa.

prevent escape of sodium and potassium chlorides as well as cyanide compounds. All heat treaters are required to bathe parts in caustic baths or de-greasers before heat treating.

Good air pollution control is typified by operations at the Security Engineering Division of Whittier, California. Manufacturers of large rock bits for drillers, the firm also operates its own heat treating plant which is equipped with three 750-cfh endothermic gas generators, one T-1200G Ipsen hardening furnace, three 35-inch by 72-inch homocarb furnaces and two 1200-pound homodraws.

Before controls were installed, according to the general foreman, "a man couldn't walk through the shop with a white shirt." Employees in other departments complained about the vast clouds of smoke and fumes coming from furnaces and oil baths.

Today, the shop is as clean as a helper's wallet just before pay day. Under peak loads, more smoke is created by cigarettes than actual operations.

How did this come about? Credit is due mainly to the huge Detrex de-greaser installed by the firm, which formerly used caustic baths for oil cleaning. Perchlorethylene is used as the cleaning agent in the de-greaser, achieving almost 100% efficiency in removal of oil, besides taking only about one-third the time necessary for caustic baths which often failed to remove oil from many depressions where air was trapped and resulted in some smoke emission in heating. Quantities of soot emissions were also eliminated by taking out salt baths and using artificial atmosphere furnaces for clean hardening.

The firm lists four important advantages to its present de-greasing operations:

- 1—No smoking on heat treating.
- 2—No alkali burns are suffered by workers using caustic baths.
- 3—Parts are cleaner and a brighter finish is obtained.
- 4—Production is speeded up.

Many other cities—Chicago, Cincinnati, Cleveland, Detroit, New York, Pittsburgh, and Philadelphia to name a few—are also smoke conscious and have laws similar to those of Los Angeles County.

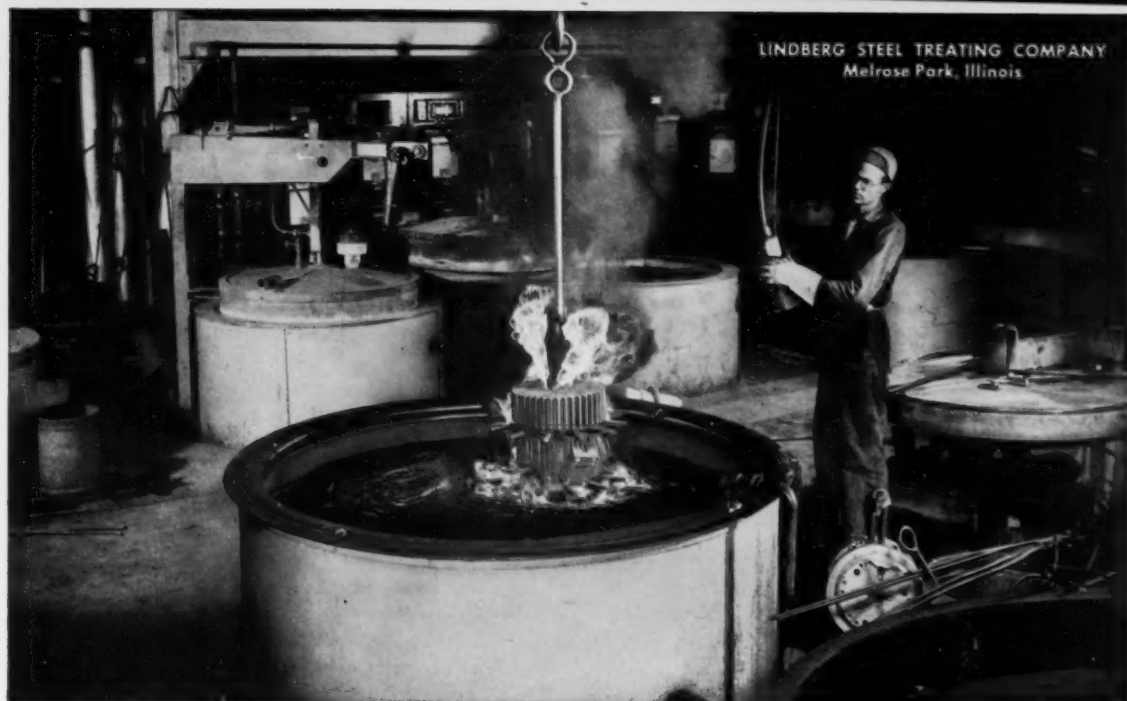
All use the simple Ringelmann Chart, as published by the U. S. Bureau of Mines, for determining opacities of smoke. The chart is composed of five square grids ranging from 20% to 100% opacity. Thickness of black lines and size of white squares between vary inversely in order of opacity.

To determine opacities, the chart is placed approximately 50 to 60 feet away from the viewer and in line with the smoke emission. Through an optical illusion, one of the grids will blend in with the smoke, determining its opacity.

Inspectors of the Los Angeles County Air Pollution Control District are trained in a special "smoke school" to recognize opacities without using the chart, impractical under ordinary field conditions. An

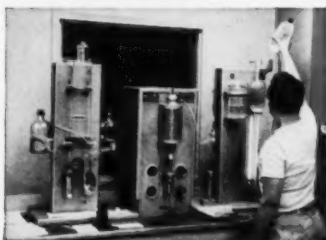
(Continued on page 40)





LINDBERG STEEL TREATING COMPANY  
Melrose Park, Illinois

## For machine shop tolerances— Lindberg uses Cities Service Quenching Oil



Lindberg's Lab stringently tests treated metals. Dimensional changes from poor quenching oil would quickly show up here. But Cities Service Quenching Oil cools metal with no significant dimensional change.



Some of Lindberg's Furnaces. Here, they heat-treat all kinds of steel products . . . bolts, washers, gear blanks, saw blade segments, etc. Steel for bars of Illinois State Penitentiary was one of their first jobs.

At Lindberg Steel Treating Company a routine order might include a dozen shafts, stamping and forming dies, jigs and fixtures and even production parts. But though the products might differ, most would carry the same stipulation—heat treat with very low dimensional change.

To some heat treating operations this might present a problem, but not to Lindberg. By the use of Cities Service Quenching Oil, they're able to cool their steel with no significant changes in dimension.

"In addition," say Lindberg metallurgists, "we like Cities Service Quenching Oil because it has high flash point, consistent viscosity, excellent oxidation resistance, and a stable cooling rate."

Anyone looking for a better quenching oil would do well to try this superior Cities Service oil. For further information, talk with your local Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

# CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



# Right Or Wrong In

## LABOR RELATIONS

**Editor's Note:** This department presents, in each issue, a round-up of day to day in-plant problems and how they were handled by management. Each incident is taken from a true-life grievance which went to arbitration. Sources of these cases will be given upon request.

### Can A Worker Be Discharged If Marital Difficulties Interfere With His Job?

#### What Happened:

Mac Allen and his wife were having a rough time in making a go of their marriage. They bickered, they fought, they argued. Their incompatibility even spilled over into Mac's workaday life. She would phone him during his shift and begin where she had left off after breakfast. Other employees were sorry for Mac, and his marital plight became common knowledge. There was a lot of sympathy for Mac even among management. Mr. Gracey, the plant superintendent, tried his hand at a reconciliation. It didn't work. Finally the Allens got a divorce.

The custody of the child was awarded to the wife, and Mac had the responsibility of mailing monthly payments for the youngster's support. One month he failed to make payment, and someone came to the plant and served him with a summons. Another time, Mac went to visit the child, and when his wife slammed the door in his face, he broke it down. She filed a criminal charge against him, and arresting officers came to the plant to take Mac to court. He was fined \$19.50 for malicious destruction—and when he failed to pay the fine, the cops came to the plant again and took him into custody.



Fed up with the whole thing, the company fired Allen. At the arbitration, the company's position was that Allen's domestic trials were becoming a matter

of public or semi-public knowledge. Employees all chattered about his problems, and this made for a disturbing atmosphere. Furthermore, Allen's family difficulties caused him to neglect his duties—even though he didn't have a job that could be measured in direct output.

Allen's main argument was that his private life was his own, and that his personal problems did not interfere with his work to the extent of warranting discharge.

Was The Company: RIGHT ☐ WRONG ☐

#### What Arbitrator A. T. Singletary Ruled:

"The Arbitrator finds that Mr. Allen's marital difficulties had reached such proportions that they did in fact interfere with the normal discharge of his duties as an employee of the company. The Arbitrator finds that although Mr. Allen was not directly responsible for some of these difficulties being called to the attention of plant personnel—nevertheless the fact that his problems did become common knowledge created an unwarranted disturbing influence at the plant. The Arbitrator refers particularly to Mrs. Allen's frequent calls, and the occasions on which officers of the law came out to the plant on account of his domestic personal difficulties. The Arbitrator finds therefore that the discharge was justified."



### Can An Employee Be Forced To Resign?

#### What Happened:

The foreman came over to May Kane one morning, and after making sure there was no one else listening, he whispered to her: "I have bad news for you".

"What kind of news", she quickly asked.

"Come with me and I'll tell you", he said, and started to lead the way. After they reached the office,

(Continued on page 36)

*Twice the life of previous heating elements!*

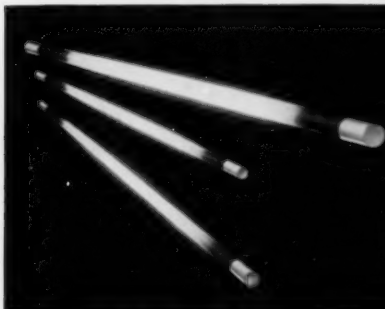
## ...a report on "HOT RODS" in intermittent service

Many plants report Norton "Hot Rods" outlast other non-metallic elements by a considerable margin. Here's a case where they're lasting twice as long — in gruelling intermittent service.

This means big savings in element costs alone. You also save maintenance expense, due to less frequent changing of elements and voltage taps. And you don't have to shut down the furnace to replace elements.

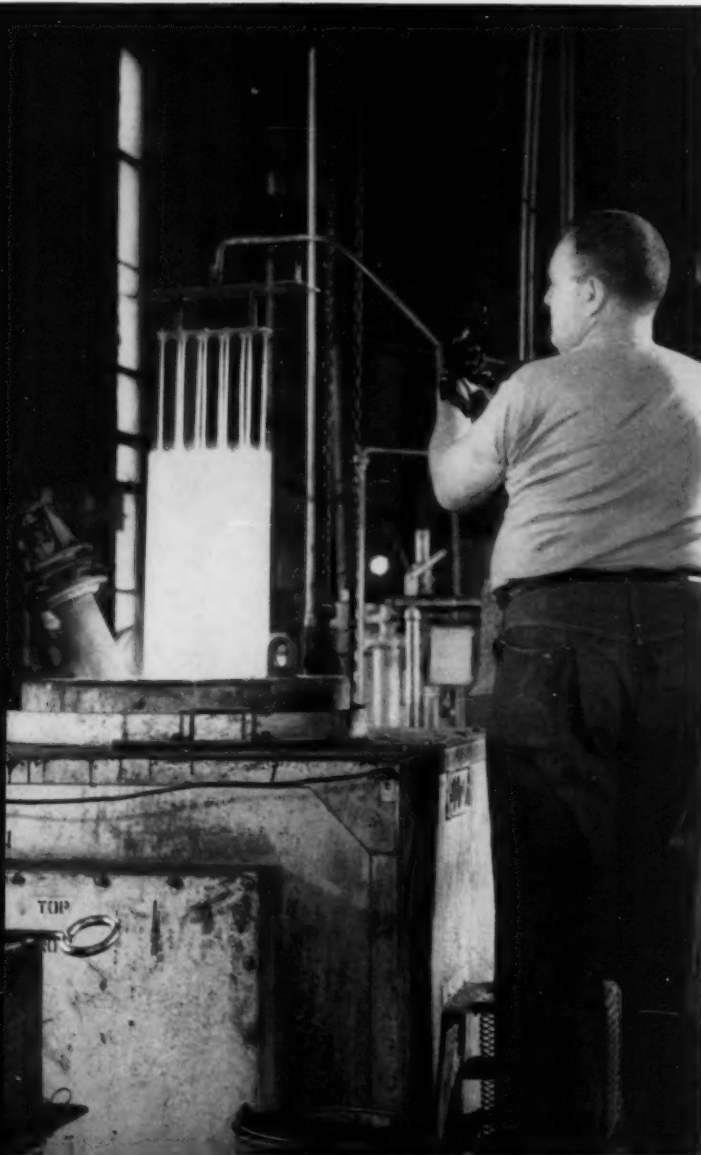
Also, "Hot Rods" heat more uniformly, due to their slow, evenly matched rate of resistance increase. This helps protect product quality and maintain a smooth production flow.

The booklet, "Norton Heating Elements," tells you more about how "Hot Rods" can help improve your furnace operations and cut costs. Write for your copy to NORTON COMPANY, Refractories Division, 626 New Bond Street, Worcester 6, Massachusetts.



**CRYSTOLON Heating Elements**, or "Hot Rods", are a typical Norton R<sub>x</sub> — an expertly engineered refractory prescription for greater efficiency and economy in electric furnace and kiln operation. Made of self-bonded silicon carbide, each rod has a central hot zone and cold ends. Aluminum-sprayed tips and metal-impregnated ends minimize resistance and power loss. Available in standard sizes and interchangeable with your present rods.

\*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries



*After Hardening At 2200°F*, white-hot hacksaw blades are lifted from a Lindberg hydriding furnace in the plant of G. W. Griffin Co., Franklin, N. H. — a well-known manufacturer of hacksaws. Norton CRYSTOLON® heating elements ("Hot Rods") are located in air outside the crucible which contains the protective atmosphere. Heating cycles are intermittent, the furnace being shut down each night. The "Hot Rods" in this installation have averaged twice the service life of the elements used previously.

**NORTON**  
REFRACTORIES

Engineered... R<sub>x</sub> ... Prescribed

*Making  
better products...  
to make  
your products  
better*

# ABSTRACTS

## Annealing and Vacuum Degassing Furnace

(The Iron Age, April 12, 1956)

Where metal degassing is a factor, vacuum furnaces offer a number of distinct advantages over the more conventional techniques. Vacuum equipment for heat treating operations could mark a new and important trend.

A manufacturer of electronic power tubes put a vacuum furnace to work on the annealing and degassing of steel rings. The experiment proved to be a significant cost saver and helped reduce part rejections to a minimum.

One of the first large scale uses of vacuum heat treating in the electronics field, this degassing installation is now in operation at Raytheon Mfg. Co., Waltham, Mass. The equipment was designed and built by High Vacuum Equipment Corp., Hingham, Mass.

Among other advantages, the new equipment is cutting operational costs, increasing degassing capacity, and markedly lowering the tube reject rate. The operation involves a 1000 lb. capacity batch-type furnace which simultaneously degasses and

anneals.

Degassing the steel rings is handled in a 36 in. x 48 in. vacuum-tight retort made of Inconel. The retort is heated in a furnace to 1850°F for 6-8 hours under high vacuum conditions. Combined effects of high temperature and vacuum allow the steel to release low temperature impurities along with such gases as nitrogen, hydrogen, and oxygen. Were these impurities to evolve during tube operation, they could put it out of service.

The vacuum furnace is a double pumped, retort-type furnace with a hot chamber in the bottom half and a cooling chamber in the upper section. Both chambers lock together to form a vacuum-tight cylinder within which a fixture carrying the steel rings can be lowered for heating or raised for cooling while under vacuum.

After the sections are secured, a vacuum of  $2.3 \times 10^{-4}$  mm Hg is created. At this point, the work is loaded into a retort in the bottom or hot zone of the furnace. Heat is then applied.

To keep pressure on both sides of the retort about equal, the fur-

nace has a double vacuum pumping system that evacuates both inside the retort and outside between the retort and the refractory wall. This is an extra precaution to protect the loaded retort during the heating cycle.

The final degassing temperature (1850°F) is reached an hour after pump-down. The work is then allowed to remain long enough for impurities and gases to evolve from the steel.

After degassing, heat is turned off and the furnace is allowed to cool to about 1200°F. Parts are then raised into the upper cooling section where cold water circulates in coils. When the work temperature is below the point of possible oxidation, the vacuum seal is broken. The work is then removed from the furnace and another cycle is ready to begin.

In addition to solving the important steel ring problem for vacuum tubes, this type of furnace has many other potential applications. A number of heat treating possibilities are now under investigation.

Future potential is bright for furnaces capable of providing both the protection afforded by vacuum together with the advantages of degassing facilities. In addition to heat treating applications, a number of brazing jobs now take advantage of this technique. ■ ■ ■

## Sound Familiar?

**SMEARCASE,**  
THE PRODUCTION  
MAN, SCHEDULES  
A JOB THROUGH  
HIS PLANT  
WITH TIME  
TO WASTE!

LET'S SEE... PLENTY OF TIME FOR A  
GOOD JOB ON OPERATION 1... NUMBER 2  
SHOULD BE ABLE TO OOOZE ALONG  
NICELY... AMPLE TIME FOR OPERATION  
NUMBER 3... THEN OUT IT GOES FOR  
HEAT TREATMENT



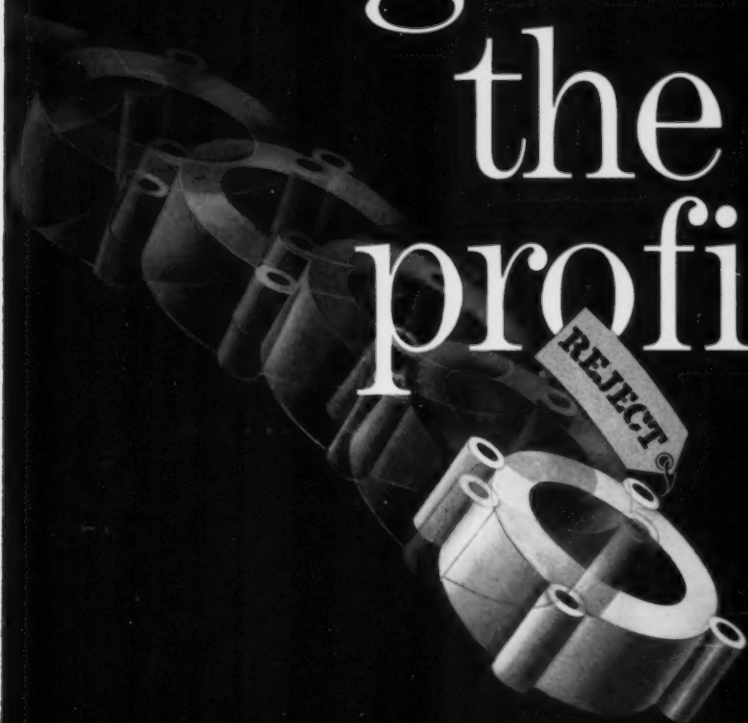
**BUT...**  
WHEN THE  
HEAT TREATER  
GETS IT... IT'S  
IN AN AWFULLY  
GREAT  
HASTE!

**SMEARCASE!** FINE, BOSS! I GOT IT TO  
THE HEAT TREATER 10 MIN-  
UTES AGO, I'M CHECKING  
WITH THEM NOW.

**HELLO! ABC HEAT TREATING?**  
WHAT? NOT THROUGH WITH OUR  
JOB? DO YOU REALIZE WE HAVE A  
TIGHT SCHEDULE? TRYING TO MAKE ME  
LOOK BAD, HUH?.. BLAH, BLAH, BLAH...



# there goes the profit...



use of impure ammonia for metal treating is a frequent cause of discoloration on finished parts

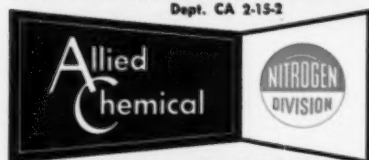
The ammonia you use for metal treating can add to your profits—or reduce them! Impurities like oil or moisture may cause discolorations that land finished work in the salvage box. They are also a common cause of poisoned catalysts and other costly dissociator troubles.

Barrett Brand Anhydrous Ammonia, Refrigeration Grade, protects your profits and production schedules because it's at least 99.98% PURE, DRY ammonia. And each cylinder is

double tested to make sure this high standard is maintained.

Barrett Brand Anhydrous Ammonia is stocked in 150, 100 or 50-lb. cylinders by distributors from coast to coast. Tank car or tank truck lots are available from Nitrogen Division's plants and bulk terminals at strategic locations.

Write for a list of Barrett Brand Anhydrous Ammonia distributors or for any technical assistance on the use of ammonia in metal treating.



40 Rector Street, New York 6, N. Y.

Ethanolamines • Ethylene Oxide • Ethylene Glycols • Urea • Formaldehyde • U. F. Concentrate—SS • Anhydrous Ammonia • Ammonia Liquor • Ammonium Sulfate • Sodium Nitrate • Methanol • Nitrogen Solutions • Nitrogen Tetroxide • Fertilizers & Feed Supplements



# THE APPRENTICE CORNER

**Editor's Note:** This is the concluding installment of the articles which appeared in the last two issues.

## WHAT CAN HAPPEN WHEN DECARB IS PRESENT

By G. E. Brumbach, Metallurgist  
The Carpenter Steel Company, Reading, Pa.

### Minutes Saved . . . Tool Lost

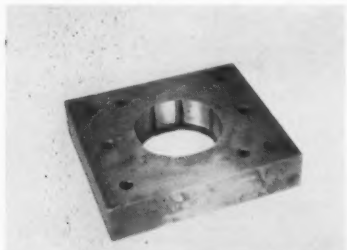
This socket wrench cracked in heat treating because the largest outside diameter of the tool was also the original bar stock—meaning that decarb was not removed.



And this was the part of the tool that failed. In contrast, there was no failure of the decarb-free machined surfaces. The hoped-for economies in eliminating some of the machining time ended in a total loss of the tool.

### Shortcut to Failure

A rush order came in for six of these blanking dies. Because the proper size of bar stock was not immediately on hand, a hot rolled bar of the exact width of the die was used. Result: six failures.

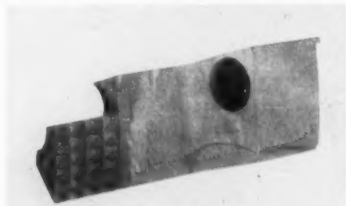


Here's another case that demonstrates the wisdom of using a size bar sufficiently large to permit cleaning up the surfaces.

### Previous Success Reverses Itself

Many chuck jaws of similar shape and dimension had been hardened successfully before. This

one cracked at the base and the crack ran up and over the tapered body—then out to the edge at about the center. Laboratory examination indicated perfect grain size but a skin of .025" decarburization had developed on all surfaces during heat treating. Further investigation of the equipment used for heat treatment disclosed a cracked



manometer tube on the air-gas ratio panel and the readings were much in error. No matter what causes decarb, it's still dangerous!

### Moral: Always Heat Treat Free of Decarb!

This clutch dog is made from a manganese-chrome-moly air-hardening tool steel. The greater part of the O.D. and the slot are normally ground after heat treating. However, the short tapered O.D. at the left end is not ground . . . and that's where flaking occurred. Sections were later cut out of the spalled area for inspection. Examination under the microscope showed decarb to a depth of .018". This was enough decarb so that in initial stages of service, a peen-

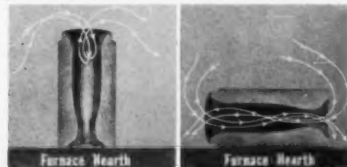


ing action took place and eventually these cold worked areas flaked or spalled out. The moral:

Make every attempt to heat treat free of decarb.

## The Importance of Good Circulation of Furnace Atmosphere

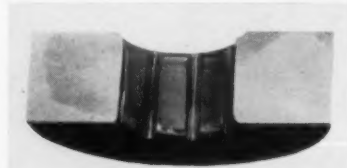
This prematurely-worn pointing die illustrates the importance of good circulation of furnace atmosphere. Note that the interior sur-



face, acid-etched for analysis purposes, is dark toward the top but silvery toward the bottom two-thirds. This silvery surface indicates the presence of decarburization. The die was placed upright in the furnace. As a result, the atmosphere could circulate only at the top, and the top of the hole was the only area that hardened free of decarb. However, merely by laying the die on its side, the atmosphere could circulate through the hole and produce a properly hardened tool.

### Two Problems—One Answer

Notice the pitted section at the entering throat, bottom and top of this half-section of a circular coining ring. (1) Because of its shape and design it could not be finish ground. (2) The die was hardened in an open gas-fired furnace with no atmosphere control available.



And even though the atmosphere produced only .004" decarburization, it was enough to cause premature wear. Since atmosphere control was impossible, they resorted to packing in cast iron chips and the problem was handily solved. It's good to keep in mind that if a certain surface cannot be ground after hardening, take extra precaution to prevent soft decarburized surfaces in heat treatment.



**"The right quench oil for our work is**

# **SHELL VOLUTA OIL 23"**

says Garland Wilcox, Chief Metallurgist  
Wallace Barnes Co., Bristol, Conn.

## **...the story of a profitable change**

WALLACE BARNES COMPANY and steel springs have "gone together" for nearly a century. Most of today's output is in SAE 1075 or 1095 steel.

Because the quenching operation is so important to the life of springs, the Wallace Barnes laboratory decided to test its regular quenching oil against some of the newer products, including Shell Voluta Oil 23. This is what they found:

Shell Voluta Oil 23 showed a superior quench rate, with correct hardening and relative freedom from distortion. It drained more rapidly from the quenched parts, re-

ducing dragout loss. It washed off more completely in the alkaline cleaner; it reduced flaming, and cut down on the oil baked to parts.

Wallace Barnes reports that this oil has almost eliminated trouble with "slack-quenched parts," and that heavier stock now goes through without special handling. So . . . Shell Voluta Oil 23 has replaced the former quench oil in all tanks of the spring hardening departments, serving salt pot lines and shaker hearth furnaces.

We'll be glad to provide full information on Shell Voluta Oil 23.

**WALLACE BARNES CO.**  
A division of Associated Spring Corp.  
Bristol, Conn.

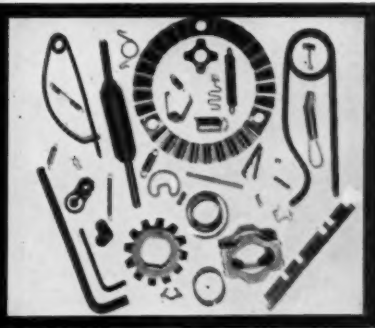
Photos courtesy "STEEL"



Shaker hearth furnaces automatically dump parts into Shell Voluta Oil 23, then remove and drain them.



Flat springs at austenitizing temperature get a fast quench in Shell Voluta Oil 23.



Over 35,000 prints of production items like these are kept on file at Wallace Barnes Co.

## **SHELL OIL COMPANY**

50 WEST 50TH STREET, NEW YORK 20, NEW YORK  
100 BUSH STREET, SAN FRANCISCO 6, CALIFORNIA



# Facilities of ... COMMERCIAL HEAT TREATERS can cut **YOUR** costs

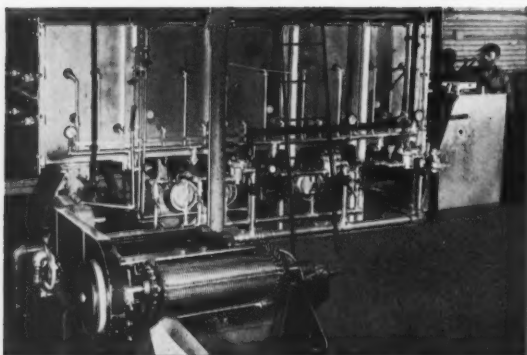


Fig. 1

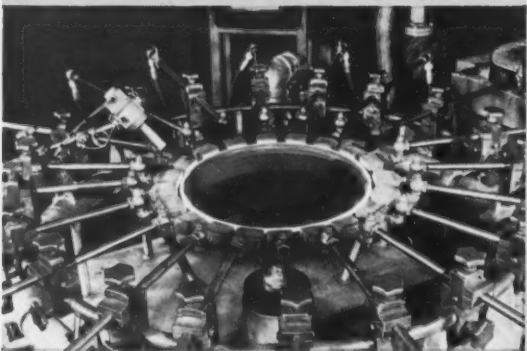


Fig. 2



Fig. 3

An MTI commercial heat treater is located near you and is ready to serve your needs by performing "Custom-tailored" heat treating operations.

Because all members of the MTI are specialists with complete service facilities centralized in one plant, they are equipped to offer you a variety of heat treating processes—atmosphere hardening, carburizing, nitriding, annealing, cyaniding, etc.

For example, Fig. 1 shows an installation of a shaker hearth furnace with a continuous automatic quenching tank and a conveyor to a washing machine.

Fig. 2 illustrates a gas flame hardening unit featuring accurate temperature control and using two semi-circular gas manifolds mounted on movable carriages with 20 or more burner heads.

A further example of versatile and dependable equipment found in a commercial heat treating plant is seen in Fig. 3. The specially designed furnace conveyor belt carries over 35 lbs. per sq. ft. in normal service and sometimes as much as 5000 lbs. are loaded on it with pieces ranging from 1/2 lb. to 100 lbs. and temperatures up to 1650°.

Possessing such equipment together with many other specialized facilities and employing the trained personnel with technical knowledge and experience is the business of the commercial heat treater. Teamwork between him and the manufacturer can cut your costs.

Get in touch with the Metal Treating Institute or any MTI member listed on the facing page when you need heat treating services.

WRITE FOR the MTI booklet called:

"STRATEGIC USE of OUTSIDE HEAT TREATING FACILITIES  
CAN CUT COSTS."

# METAL T

271 N

## Consult any of these HEAT TREATING SPECIALISTS

### ALABAMA

Southern Metal Treating Co., Inc.  
3131 10th Ave., North, Birmingham 4

### CALIFORNIA

Hollywood Heat Treating Co.  
6902 Santa Monica Blvd., Los Angeles 38  
Lindberg Steel Treating Co.  
2910 S. Sunol Drive, Los Angeles 23  
Alloy Heat Treating Co.  
11648 So. Atlantic, Lynwood  
Book Induction Heating Co.  
4925 East Slauson Ave., Maywood  
Industrial Steel Treating Co.  
1549—32nd St., Oakland 8

### COLORADO

Metal Treating & Research Co.  
4110 Fox St., Denver 16

### CONNECTICUT

Commercial Metal Treating, Inc.  
89 Island Brook Ave., Bridgeport 6  
Stanley P. Rockwell Co.  
296 Homestead Ave., Hartford 12

### ILLINOIS

Enecca Heat Treating Co.  
124 S. Batavia Ave., Batavia  
Accurate Steel Treating Co.  
2226 W. Hubbard St., Chicago 12  
Sura-Hard Steel Treating Co.  
2333 West Deming Place, Chicago 47  
Carson Industrial Steel Treating Co.  
5757 W. Ogden Ave., Chicago 50  
Perfection Tool & Metal Heat Treating Co.  
1756 West Hubbard St., Chicago 22  
Fred A. Snow Co.  
1942 West Kinzie St., Chicago 22  
American Steel Treating Co.  
P. O. Box 225, Crystal Lake  
Klund Metal Treating, Inc.  
721 Beacon St., Loves Park  
Lindberg Steel Treating Co.  
1975 No. Ruby St., Melrose Park  
T. Muehlemaier Heat Treating Co.  
1531 Preston St., Rockford  
U. Scott & Son, Inc.  
1510 First Ave., Rock Island

### MARYLAND

Maryland Tool Company  
111-13 Hollingsworth St., Baltimore 2

### MASSACHUSETTS

New England Metallurgical Corp.  
475 Dorchester Ave., South Boston 27  
Porter Forge & Furnace, Inc.  
74 Foley St., Somerville 43  
Greenman Steel Treating Co.  
284 Grove St., Worcester 5

### MICHIGAN

Anderson Steel Treating Co.  
1337 Maple St., Detroit 7  
Bosworth Steel Treating Co.  
18174 West Chicago Blvd., Detroit 28  
Commercial Steel Treating Corp.  
6100 Tireman Ave., Detroit 4  
Commonwealth Industries, Inc.  
5922 Commonwealth Ave., Detroit 8  
Michigan Steel Processing Co.  
3120 Denton, Detroit 11  
Standard Steel Treating Co.  
3468 Lovett Avenue, Detroit 10  
Vincent Steel Process Co.  
2424 Bellevue Ave., Detroit 7  
State Heat Treat, Inc.  
520 32nd Street, S. E., Grand Rapids 8  
Metallurgical Processing Company  
2703 East Nine Mile Road, Hazel Park  
American Metal Processing Co.  
12000 East Nine Mile Road, Van Dyke

### MINNESOTA

Metallurgical, Inc.  
900 East Hennepin, Minneapolis 14

### MISSOURI

Metallurgical, Inc.  
1727 Manchester Ave., Kansas City 8  
Lindberg Steel Treating Co.  
650 East Taylor Ave., St. Louis 15  
Paulo Products Co.  
5711 West Park Ave., St. Louis 10

### NEW JERSEY

Ace Metal Treating Corp.  
611 Grove St., Elizabeth  
American Metal Treatment Co.  
Highway 25 and LaFayette St., Elizabeth  
Benedict-Miller, Inc.  
Marin Ave. and Orient Way, Lyndhurst  
Bennett Heat Treating Co., Inc.  
246 Raymond Boulevard, Newark 5  
L-R Heat Treating Co.  
107 Vesey St., Newark 5  
Temperature Processing Co., Inc.  
228 River Road, North Arlington

### NEW YORK

Fred Heinzelman & Sons  
138 Spring St., New York 12  
Alfred Heller Heat Treating Co., Inc.  
391 Pearl St., New York 38  
Lindberg Steel Treating Co.  
620 Buffalo Road, Rochester 11  
Rochester Steel Treating Works  
962 Main Street, E., Rochester 5  
Syracuse Heat Treating Corp.  
1223 Burnet Ave., Syracuse 3

### OHIO

Queen City Steel Treating Co.  
2980 Spring Grove Ave., Cincinnati 25  
Ferrotherm Co.  
1861 E. 65th St., Cleveland 3  
Lakeside Steel Improvement Co.  
5418 Lakeside Ave., Cleveland 14  
George H. Porter Steel Treating Co.  
1273 East 55th Street, Cleveland 3  
Reliable Metallurgical Service, Inc.  
3827 Lakeside Ave., Cleveland 14  
Winton Heat Treating Co.  
20003 West Lake Road, Cleveland 16  
Dayton Forging & Heat Treating Co.  
2323 East First St., Dayton 3  
Ohio Heat Treating Co.  
1100 East Third St., Dayton 2

### PENNSYLVANIA

Robert Wooler  
Limekiln Pike, Dresher  
J. W. Rex Co.  
834 West 3rd St., Lansdale  
Drever Company  
220 West Cambria St., Philadelphia 33  
Lorenz & Son  
1351 N. Front St., Philadelphia 22  
Metlab Company  
1000 East Mermaid Lane, Philadelphia 18  
Wiedemann Machine Co.  
4272 Wissahickon Ave., Philadelphia 32  
Pittsburgh Commercial Heat Treating Co.  
49th St. and A.V.R.R., Pittsburgh 1

### TEXAS

Dominy Heat Treating Corp.  
P. O. Box 5054, Dallas  
Superior Heat Treating Co., Inc.  
P. O. Box 1686, Fort Worth 1  
Cook Heat Treating Co., of Texas  
6233 Navigation Boulevard, Houston 11  
Lone Star Heat Treating Corp.  
5212 Clinton Dr., Houston 20

### WISCONSIN

Allied Metal Treating Corp.  
830 S. Fifth St., P. O. Box 612, Milwaukee 1  
Metal Treating, Inc.  
720 South 16th St., Milwaukee 4  
Supreme Metal Treating Co.  
4440 West Mitchell St., Milwaukee 14  
Thurner Heat Treating Co.  
809 West National Ave., Milwaukee 4  
Wisconsin Steel Treating & Blasting Co.  
1114 South 41st Street, Milwaukee 15  
Harris Metals Treating Co.  
4100 Douglas Ave., Racine

### CANADA

B. & W. Precision Heat Treating Co.  
70 Borden Ave., S., Kitchener, Ontario

# HEATING INSTITUTE

4 AVENUE

NEW ROCHELLE, N. Y.



or consult the MTI members listed above

## NEWS TO HEAT TREATERS...

### TRINKS AWARD IN INDUSTRIAL HEATING

Two executives and two engineers who have made important contributions to the science of industrial heating, were recipients recently of the Trinks Industrial Heating Award, highest honor in the industry.

The four honored were John W. Harsch, director of engineering of Leeds & Northrup Company, Philadelphia; William C. Dunn, chairman of the board, Ohio Crankshaft Company, Cleveland; Osgood J. Whittemore, Jr., research ceramic engineer, Norton Company, Worcester, Mass.; and Ernest G. de Coriolis, for 30 years the director of research and development, Surface Combustion Corporation, Toledo, Ohio.



J. W. Harsch



O. J. Whittemore



W. C. Dunn

The Award, bestowed annually by a judges' panel of industrial heating authorities, is named after Willibald Trinks, professor emeritus of Carnegie Institute of Technology, a member of the panel, first recipient of the Award and world authority on industrial heating problems.

Other judges are Dr. John C. Warner, president of Carnegie Tech; T. J. Ess, managing director of the Association of Iron and Steel Engineers and editor of *The Iron and Steel Engineer*; Carl L. Ipsen, executive vice president of Industrial Heating Equipment Association, and Glen C. Riegel, Aiken, S. C., retired chief metallurgist of Caterpillar Tractor Company.



E. G. De Coriolis

### HARDNESS CONVERTER

A pocket-size (4" x 6") harness converter chart for steels mounted on stiff cardboard for easy handling is now being offered for sale by *Steel* magazine. It contains seven different scales, and by moving a fine line so that it passes through the known hardness, one can then read the equivalent hardnesses where the line intersects the other scales. Send 25¢ directly to *Steel*, Penton Bldg., Cleveland 13, Ohio, if you desire to order one.

### NEW SALES MANAGER

Robert N. Lynch has been appointed Sales Manager of the Industrial Heating Equipment Company, Detroit, manufacturers of



automated metal treating equipment. Mr. Lynch was formerly Sales Manager of Park Chemical Company.

### CORROSION PROTECTION

Production and distribution of "Rust Veto" spray, to protect all metals from corrosion merely by



the pressure of a finger, was announced by Krylon, Inc., Norristown, Pa.



Rust Veto, which has thousands of potential uses in industry, applies anti-rust protection in a matter of seconds and without fuss or stains or the concoction of special preparations.

The new product is said effectively to protect such items as dies, tools, polished steel, and critical surfaces on important machines and equipment.

For further information circle No. 1

#### TOOL STEEL MANAGER

A. H. Lewis has been appointed Manager of Tool Steel Sales for Crucible Steel Company of America.

James D. Glenn, Vice President and General Manager of Sales, in making the announcement said,



"Mr. Lewis, former Sales Manager of Vacuum Metals Corporation,

has had wide experience in the problems of specialty steel sales. His experience in mill production of tool steels as Chief Metallurgist of our former Sanderson Works in Syracuse, N. Y. well qualifies him to provide our customers with both practical and technical assistance. Mr. Lewis will have his headquarters in the Oliver Building, Pittsburgh."

#### NEW FLOW COUNTER

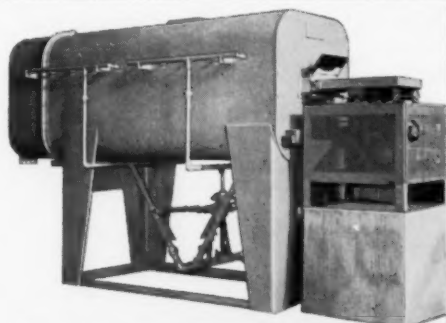
A new Norelco Flow Proportional Counter, effectively detects and measures all elements down to and including magnesium (#12), is extremely sensitive, has a high counting rate exceeding 60,000 counts per second for soft radiation, and has excellent reproduction qualities, according to an announcement by the Instruments Division, North American Philips Company, Inc., Mount Vernon, New York.

The new device is designed for use with the standard Norelco X-



ray Spectrograph and Helium Attachment when the latter is required. A special harmless gas flows through the interior of the counter.

When the X-Ray beam is surrounded by a helium atmosphere, one side of the counter window is in contact with the special gas and the other side is in contact with helium. Both gases are maintained at pressures that are approximately equal. A specially de-



Have You Investigated the Savings in  
**CONTINUOUS HEAT TREATING  
OF SMALL PARTS?**

**DFC Shaker Hearth Furnaces**

**ARE FOR CONTINUOUS PRODUCTION  
MULTI-PURPOSE  
EFFICIENT  
SIMPLE TO USE**

Ideal gas fired furnaces for automatic heat treating of small parts. For Carburizing, Nitriding, Carbonitriding, etc., to 1800° F. Designed for accurate control of quality. Write for details. Quotation to your needs.

**BOSTON**  
Klein-Farris Co.  
683 Atlantic Ave.

**CHICAGO**  
Abbott Corporation  
808 West Erie St.

**DETROIT**  
R. W. Morgan Co.  
12099 Woodbine St.

**HOUSTON**  
McArdle Equipment Co.  
5724 Navigation Blvd.

**INDIANAPOLIS**  
Loy Instrument Co.  
2323 N. Sheridan Ave.

**LOS ANGELES**  
Automatic Inst. Service Co.  
7807 So. Compton Ave.

**MILWAUKEE**  
C. C. Schroeder & Associates  
4104 W. Greenfield Ave.

**MINNEAPOLIS**  
American Steel Prod. Co.  
2828 Lyndale Ave. South

**OAKLAND**  
Russo Foundry Equip. Co.  
3882 Fairway Ave.

**OMAHA**  
Fuchs Mach. & Supply Co.  
2401 No. 11th St.

**PITTSBURGH**  
John E. Figner Co.  
1123 La Clair Ave.

**ST. LOUIS**  
Shea-Brownell Co.  
3903 Olive Street





signed holder permits windows of different thicknesses to be mounted.

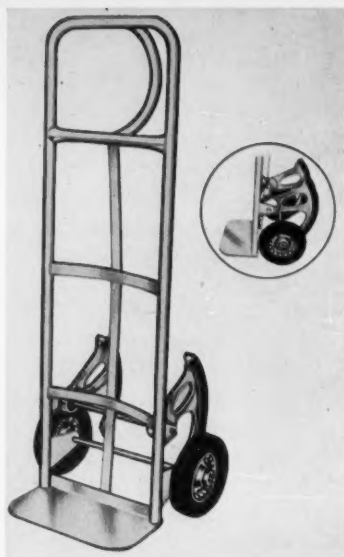
The gas which flows through the interior of the counter is a mixture that is purchased in standard high pressure cylinders from commercial gas manufacturers under Norelco specifications. Operating costs for this item are very low.

For further information circle No. 2

### STAIR-CLIMBING TRUCK

Precision Equipment Co. announces production of a new stair-climbing truck which has been designed to fill the needs of countless firms who have found it necessary to drag loads over curbs and up and down stairways.

Moving stock to upstairs or basement stock-rooms need no longer be a back-breaking, hazardous chore! E-Z Climber's two rocker-arms act like an extra pair of wheels . . . keep the truck on a constant line for friction-free travel. It is of great value also, in moving parts and partially completed goods to departments located on the different



floors of factories. Its size and superb maneuverability make it ideally suited even where there are doorway and aisle limitations. Load capacity is 600 lbs. Overall size 46"H x 18 3/4"W. Attractive red finish. Shipping weight is 39 lbs.

For further information circle No. 3

## Another Satisfied Stanwood Heat Treating Equipment Customer!

This side dumping, low temperature heat treating and quenching basket was designed to meet the specific requirements of one of our customers—and that it does. Heat resistant alloy throughout, amply reinforced bottom, easy to load, dump and handle through the furnace.



No. 347

This durable, versatile carburizing fixture took care of another customer. Handles spiders, ring gears, collars, bushings, etc., which are slipped over the square perforated tubes. Stanwood Heat Treating Equipment can solve your problem—Send for Catalog.



No. 313



**Stanwood**

4825 W. CORTLAND ST.



**Corporation**

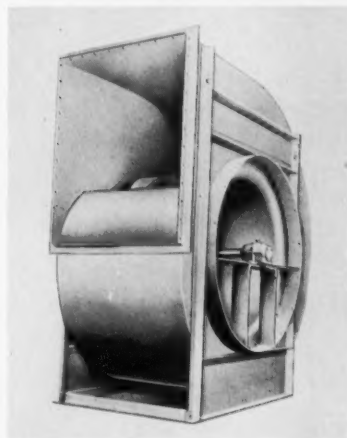
CHICAGO 39, ILLINOIS

### AIRFOIL CENTRIFUGAL FANS

A new line of centrifugal fans with Airfoil blading has been announced by the Sturtevant Division of Westinghouse Electric Corporation.

The new fans make possible 92 percent peak mechanical efficiency and 88 percent static efficiency in the movement of air in high pressure air conditioning, industrial process ventilation and vehicular tunnel ventilation.

Each fan in the series has an extremely low operating cost since maximum horsepower is attained



within the normal range of fan selection. The fans are designed for direct connection to conventional squirrel cage induction motors operated at standard motor speeds. Sixteen fan models are offered with wheel diameters ranging from 27 to 108 inches in diameter.

For further information circle No. 4

### HIGH-VISIBILITY SLIP-PROOFING

HEAVY-DUTY GRIP is now offered in brilliant aluminum finish and is said to make any surface skid-proof, safe. It assures firm footing, positive traction on floors, stairs, platforms, landings, ramps, balconies, docks, steel loading plates, truck steps and tail boards, scaffolds, swing stages, foot bridges . . . in halls, aisles, wash rooms, shower stalls . . . around machines, wash and grease racks, etc. It brightens and greatly increases visibility on

(Continued on page 33)

METAL TREATING



# Tool Steel Topics



On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributors  
Bethlehem Steel Export Corporation



## Maker of Washers Rings the Bell with Die Made of Lehigh H

A manufacturer of steel washers found that by using a piercing die made of Lehigh H tool steel, he could get longer, more economical production runs than with dies of another grade, formerly used.

The Lehigh H die produces thousands of round washers daily, in sizes from  $\frac{5}{8}$  in. to 1 in. It is hardened to approximately Rockwell C 61, and pierces

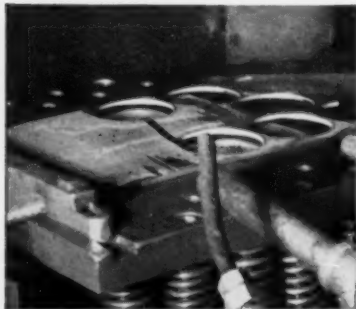
$\frac{5}{32}$ -in. C 1035 steel sheet. Because of the severity of the piercing operation, redressing of the die is required after every third turn, but only 0.020 in. is removed. Close to 100,000 washers are turned out between grinds.

Lehigh H handles this blanking job to perfection because of its outstanding wear-resistance and toughness. Lehigh H is a superb high-carbon, high-chromium grade of air-hardening tool steel. It can always be counted upon for a good job because of its resistance to wear, minimum distortion in heat-treatment, and high compressive strength.

### TYPICAL ANALYSIS

Carbon 1.55	Molybdenum 0.80
Chromium 11.50	Vanadium 0.40

If there are applications in your shop which require a combination of wear- and shock-resistance, plus high compressive strength, look into the advantages of Lehigh H. Your local Bethlehem tool steel distributor, as friendly a man as you'll find anywhere, is at your service.



## FILM "TEAMWORK" WINS AWARD AT COLUMBUS FESTIVAL



"Teamwork," our new 30-minute color film on tool steel, received an award for excellence in the Business and Industry category at the recent Fourth Annual Columbus Film Festival.

"Teamwork" takes you behind the scenes in describing typical applications of our carbon, oil- and air-hardening, shock-resisting, hot-work and high-speed tool steels. It is now available for showings to die-makers, heat-treaters, machinists, machine-tool manufacturers and distributors. It's also an excellent film for technical society meetings, and for student groups.

It's easy to arrange to see "Teamwork." All you need do is drop a line to the nearest Bethlehem office, or to Publications Department, Bethlehem Steel Company, Bethlehem, Pa. If possible, please select a showing date well in advance, to allow time for scheduling and shipping.

## BETHLEHEM TOOL STEEL ENGINEER SAYS:

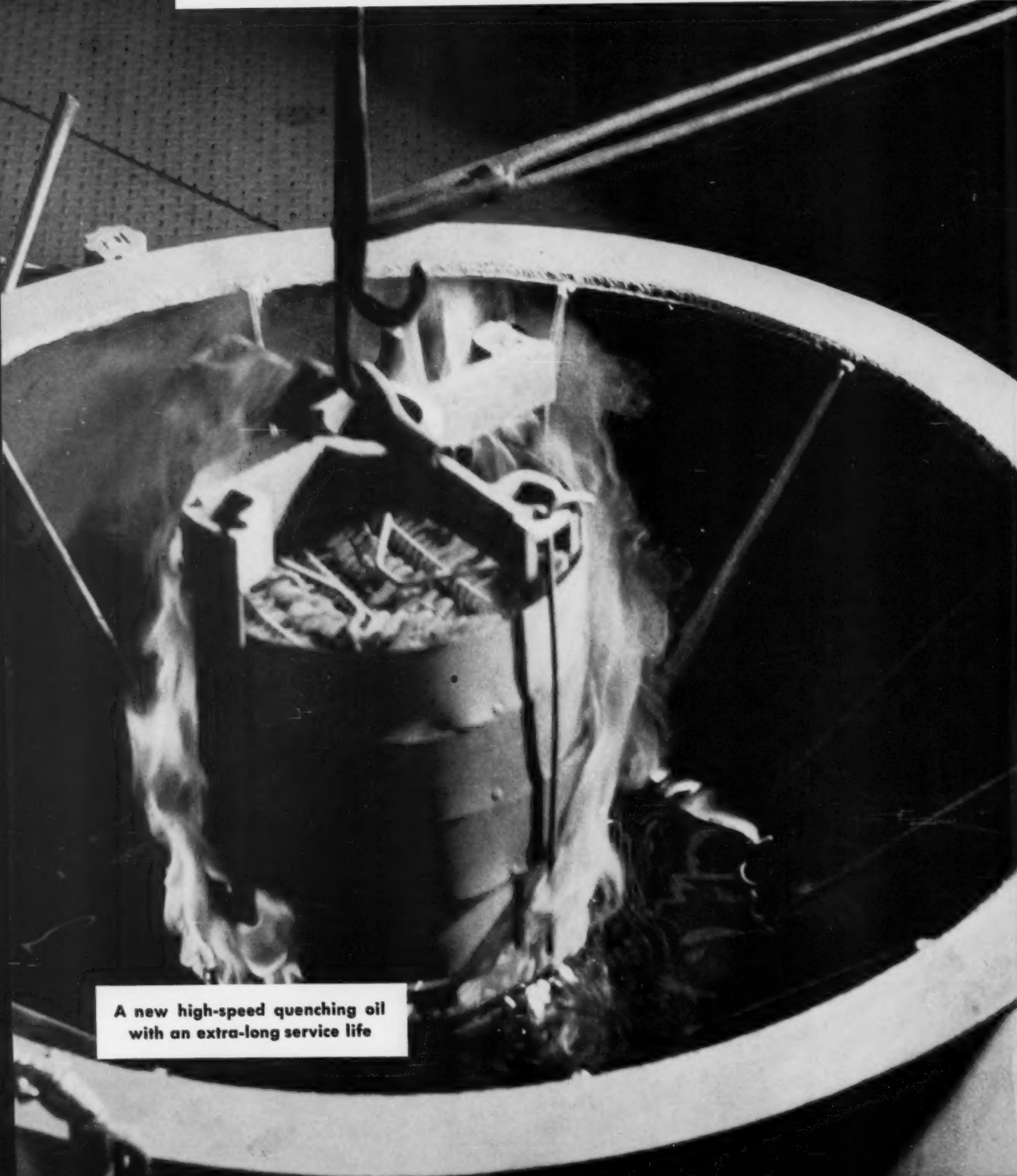


Punched Holes Often Close-in

In precision punching it is common practice to make the punch diameter exactly the same as that of the desired hole. (All the clearance required is then applied to the I.D. of the die.) For many operations involving holes greater than 1 in. diameter, for example, and stock less than  $\frac{1}{8}$  in. thick, this procedure is correct. But in other operations it is incorrect, because the elasticity of the stock causes the holes to close-in after punching, so that the holes are actually smaller than the punch which made them.

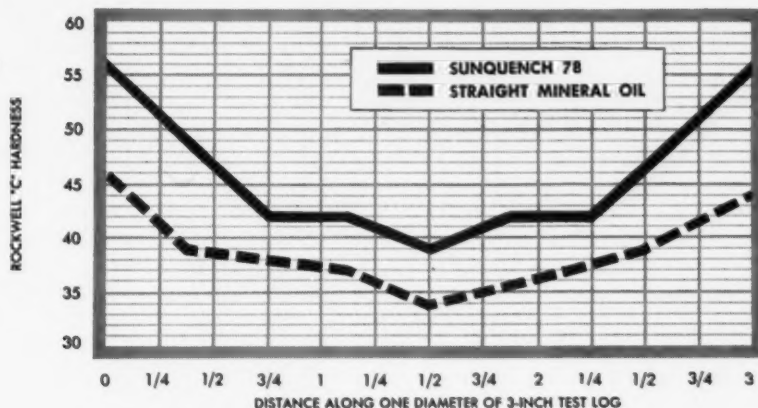
With large-diameter holes and thin stock, the elastic springback which tends to close-in a punched hole causes the stock to buckle instead, so that the hole diameter will be accurate under these conditions. On holes 1 in. in diameter and smaller, expect a close-in of 0.002 to 0.003 in. with stock  $\frac{1}{8}$  in. to  $\frac{1}{4}$  in. thick, and a closing of 0.001 in. on stock 0.030 in. thick (22 gage). Closing will be negligible on stock 0.010 in. thick (32 gage) or less. For precision punching, therefore, add the expected close-in to the punch size to produce the correct hole diameter.

**NEW! FAST! LONG LASTING!...**



**A new high-speed quenching oil  
with an extra-long service life**

# ...SUNQUENCH 78



Three-inch test logs of AISI 4140 were quenched in both SUNQUENCH 78 and a conventional quenching oil. The graph shows the results.

**SUNQUENCH 78\*** was developed for those tough quenching jobs where a conventional quenching oil can't give you satisfactory results. For example:

**Easily distorted parts** can be satisfactorily quenched in SUNQUENCH 78. It rapidly wets out all surfaces and produces a uniform quenching action.

**Baskets of tightly packed parts** can be quenched more uniformly because of the efficient cooling action of SUNQUENCH 78.

**Baths with inadequate agitation** frequently can't develop full hardness with conventional quenching oils. Here again, SUNQUENCH 78 is the answer.

**Steels of low hardenability**, which have been substituted for more expensive alloy steels, develop maximum hardness and strength when they are quenched in SUNQUENCH 78.

The long service life of SUNQUENCH 78 is just as important as its high-speed quenching action. Special inhibitors give SUNQUENCH 78 an exceptionally high thermal and oxidation stability. Even at abnormally high quenching-bath temperatures, SUNQUENCH 78 has very little tendency to thicken-up or form cooler-clogging sludge.

For more information on new SUNQUENCH 78, and other Sun Quenching Oils, see your Sun representative or write SUN OIL COMPANY, Philadelphia 3, Pa., Dept. MR-7.



INDUSTRIAL PRODUCTS DEPARTMENT

**SUN OIL COMPANY** PHILADELPHIA 3, PA.

© SUN OIL CO.

IN CANADA: SUN OIL COMPANY LIMITED, TORONTO AND MONTREAL



# INSTITUTE NEWS



## Member Licensed by ACP

The J. W. Rex Company, Lansdale, Pa., has become the first licensed processor of architectural "Alodized" aluminum as licensed by the American Chemical Paint Co. of Ambler, Pa. Alodizing® now supplements the conventional anodizing offered by the company's Chem-Fin Division since 1948.

The Alodizing process forms a corrosion-resistant, amorphous phosphate surface on the aluminum that reduces glare by 30% or more and is said to provide good color retention.

The Rex Company is processing the light gray-green Alodized aluminum panels that make up the prefabricated outer wall sections for the Chetwynd Apartments now being built at Rosemont, Pa.

## Lindberg Addition

A contract award for a 162 x 170 ft. addition to the existing 60 x 100 ft. one-story brick building of Lindberg Steel Treating Company of Melrose Park, Illinois was recently announced. Thomas J. Higgins Assoc., Inc. is the consulting engineer and George I. Uitti, 228 North La Salle Street, Chicago, Illinois, is the structural engineer for the project. The contract was for \$250,000.

## Two New Members

The following two companies have been admitted to membership in the Metal Treating Institute with the necessary approval of the Board of Trustees and local members:

Metallurgical Processing  
Company  
2703 East Nine Mile Road  
Hazel Park, Michigan

Mr. Roger W. Carothers  
—Vice President

Wisconsin Steel Treating  
& Blasting Co.

1114 South 41st Street  
Milwaukee 15, Wisconsin

Mr. Theodore Dolhun  
—President

## Board of Trustees Meeting

President Bosworth called a meeting of the Board of Trustees and the Executive Secretary of the Metal Treating Institute to meet in Chicago, Illinois, for a two-day session at the Hotel Sheraton on June 5 and 6.

The meeting was very successful and produced many constructive suggestions for the welfare of the Institute, together with many ideas and projects for the future activities of the various committees and members of the Institute. Specific Board action was taken on a number of matters.

## 1956 Annual Meeting

The Hotel Cleveland, Cleveland, Ohio, has been selected as the site for this year's Annual Meeting of the Metal Treating Institute which will be held on October 5, 6, and 7. The program is not yet complete, but it promises to be of value and interest to all the membership.

President Howard Bosworth has announced that the Nominating Committee is at work in selecting a slate of nominees to be presented to the membership for the election of next year's officers and Board of Trustees. The Nominating Committee members are: Chairman, Charles G. Heilman of Commonwealth Industries, Inc.; and A. Dudley Bach of New England Metallurgical Corp.; C. M. Cook of Cook Heat Treating Co. of

Texas; Clarence F. Graham of Metal Treating, Inc.; and Horace C. Knerr of Metlab Company.

One of the interesting events of the meeting will be the presentation of the third *Annual Metal Treating Institute Achievement Award* to the author of the most outstanding lecture presented at the 1955 Annual Meeting or the 1956 Spring Meeting, or for any feature article appearing in *METAL TREATING* between the September-October 1955 issue and the July-August 1956 issue.

## Fire at Member Plant

It is with regret that we must report a fire which burned out the property of the Metro Heat Treat Company located at 9 Victoria Terrace, Ridgely, N. J. The equipment, valued at a cost of over \$200,000, was offered for sale during July and consisted of all types of heat treating, plating, laboratory equipment, testing equipment, sandblasting equipment, etc.

## Member Honored

A few weeks ago the Polytechnic Institute of Brooklyn celebrated the conclusion of its first one hundred years of service to the community. The conclusion of the Centennial celebration was marked by a public expression and recognition of the stature and achievements of the alumni of the college during the celebration of Alumni Day.

Fred Heinzelman, Jr. of Fred Heinzelman & Sons was chosen as one of 100 alumni selected as representative of the whole body of alumni to be honored by receiving from the Institute a Certificate of Achievement in recognition of his accomplishments in engineering, industry and public service. ■ ■ ■

## NEWS TO HEAT TREATERS

(Continued from page 28)

stairways, corridors, interiors of truck bodies and other dimly lit areas.



It is claimed to stick to anything . . . metal, wood, concrete, even glass. Can be used indoors or out . . . is immune to water, gasoline, oil, grease, solvents or fats. Sand-paper-like in texture, it wears like iron even under heavy truck traffic. It is manufactured by the Hallemitte Manufacturing Co., Cleveland, Ohio.

For further information circle No. 5

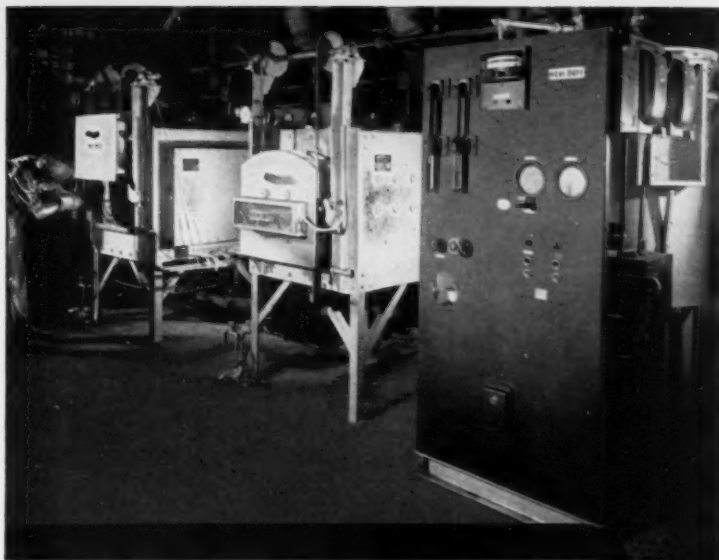
### SPRAY TREATS BURNS

A new push-button spray bomb that both treats burns and protects the skin with a cooling emollient



film has been announced by the General Scientific Equipment Company, Philadelphia, Pa.

Called G-63 Burn Relief Spray,



## Tools and Dies Heat Treated in...

# HEVI DUTY. Controlled ATMOSPHERE FURNACES

Allis-Chalmers of Milwaukee is using Hevi Duty Controlled Atmosphere Furnaces to heat treat tools and dies made from high carbon, high chrome steels, 18-4-1, molybdenum, and cobalt high speed steels. Maintaining the exact surface carbon content of the tools and dies during heat treating is achieved with —

- A Hevi Duty Endothermic Atmosphere Generator supplying 500 cubic feet per hour of prepared atmosphere. With this controlled atmosphere, troublesome scale and decarburization or carburization of the surface is eliminated.
- A Hevi Duty Box Type Hardening Furnace, designed for temperatures to 2000° F., is used for preheating high speed steels and hardening carbon steels.
- A Hevi Duty High Temperature Furnace, designed for temperatures to 2600° F., is used to harden the high speed steels.

This combination assures you that tools and dies can be treated to exact hardness. Achieve better heat treating results by specifying Hevi Duty Furnaces. Write for Bulletin 153.

## HEVI DUTY ELECTRIC COMPANY

MILWAUKEE 1, WISCONSIN

Heat Treating Furnaces... Electric Exclusively  
Dry Type Transformers Constant Current Regulators

# MISCO

*Specialists*  
IN  
**NICKEL-BEARING  
ALLOY  
FABRICATION**

**Heat and  
Corrosion  
Equipment**

**Processing  
Equipment**



*Specialized*  
**HEAT-RESISTING  
ALLOY**

- Design
- Development
- Fabrication

**MISCO Engineered  
BASKETS • TRAYS  
RETORTS • HOODS  
BOXES • MUFFLES  
FIXTURES**

*Specify* **MISCO**  
**DESIGN and FABRICATION**  
**IT COSTS NO MORE!**

**MISCO FABRICATORS, INC.**  
*Designers, Builders, Fabricators of Heat Resisting Alloy  
and Stainless Steel Equipment*

3564 TOLEDO AVENUE • DETROIT 16, MICHIGAN  
TELEPHONE TASHMOO 5-8380

this new product contains analgesic agents to alleviate pain, and hexachlorophene to preclude possible secondary infection. It promotes rapid resorption of abnormal fluids in the afflicted area, resulting in reduction of painful swelling. The invisible film deposited by the spray isolates the burn and keeps skin moist and soft; it eliminates the need for bandages or dressings.

For further information circle No. 6

## ENDOTHERMIC GENERATOR

The G-150-E, laboratory-size endothermic generator, is the most recent addition to the extensive line of controller atmosphere processing equipment produced by Ipsen Industries, Inc., Rockford, Illinois.



This electrically heated generator is ideal for the small scale heat treatments usually required in the laboratory or tool room heat treat department. Rated output is approximately 150 cfh of endothermic atmosphere gas.

For further information circle No. 7

## NEW OFFICERS AT PARK CHEMICAL

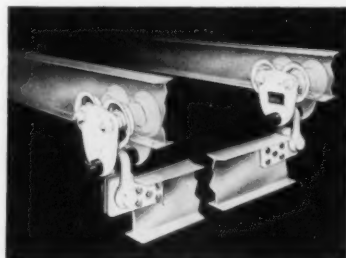
At a recent directors' meeting of Park Chemical Company, W. P. Woodside, Jr., President, announced that the following men were elected officers by the board: H. D. Kitchen, formerly Secretary and Treasurer, to Executive Vice-President and Secretary; C. R. Fore-

man to Vice-President in Charge of Sales; and Robert J. Mitchell to Treasurer.

## BRIDGE CRANE KIT

Shaw-Box Crane & Hoist Division of Manning, Maxwell & Moore, Inc., Muskegon, Michigan, is marketing a kit for less than one hundred dollars from which a push-type underhung bridge crane can be easily assembled.

Called the 'Budgit' Single Carriage Bridge Crane Assembly, the kit can be installed on a locally



purchased bridge I-beam in less than two hours. Five holes drilled in each end of the I-beam permit bolting the two trolleys provided to the ends of the beam.

The cranes will handle spans up to 25 feet and are available in capacities up to 2000 lbs. Wheels are easily adjustable to operate on American Standard I-beams of from 6" to 12" size.

For further information circle No. 8

**NEW General**

**FLEXIBLE  
POWER  
STRAIGHTENING  
PRESSES**

**WITH  
AIR CONTROLLED CLUTCH**

- SLASH TIME
- INCREASE PARTS PER HOUR
- MAKE MONEY

*General Mfg. Co.*  
6433 FAIRBANKS  
DETROIT 11, Mich.

The  
Metal Treating Institute  
Annual  
Achievement Award

*The award is made at the discretion of a Committee appointed to select the Best Article appearing in METAL TREATING magazine or Lecture presented at any meeting of the Institute.*

*This year's award shall be presented at the 1956 Annual Meeting of the Institute, and all Articles appearing in any issue of METAL TREATING from September-October 1955 to July-August 1956, or any Lectures presented at the 1955 Annual and 1956 Spring Meetings are eligible for consideration.*

**Award Committee—**

H. N. Bosworth, *President, Metal Treating Institute*

H. C. Knerr, *Chairman, Publication Committee*

L. G. Field, Fred Heinzelman, Jr., N. R. Hodgson,  
K. U. Jenks, Michael Kober, C. R. Weir;  
*members, Publication Committee*

C. E. Herington, *Editor, METAL TREATING*

To

## *Those concerned with* **QUALITY HEAT TREATING**

No other method presently in use can match the uniform heating produced by the recirculation of hot gases.

The flow of hot gases properly channeled through the work in sufficient volume constitutes the most efficient heating obtainable.

Temperatures from 300°-1800° F. can be held within extremely close limits.

Homogeneous penetration of carbon in carbonitriding and carburizing is accomplished by the use of effective recirculating fans.

For example: automotive piston pins are carburized to a case depth of .040" to .050" more uniformly and in a shorter time in a furnace in which the active gases are recirculated. This recirculation is produced by special alloy fans.

In lower temperature "Circ-Air" furnaces high velocity fans force the hot gases through the work with no temperature head. Thus thin and thick sections heat more evenly. The entire work load comes to heat uniformly. Only in a "Circ-Air" furnace heated by recirculation can this type of heat control be achieved.

### **"CIRC-AIR"**

Get More Facts About Recirculation —

*Write*

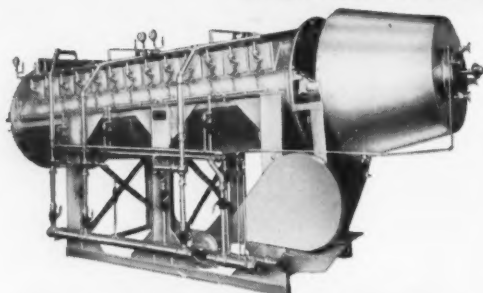


**INDUSTRIAL HEATING EQUIPMENT COMPANY**

3570 FREMONT PLACE  
DETROIT 7, MICHIGAN



## COMPLETELY ENGINEERED INSTALLATION



### YOUR AUTOMATIC HEAT TREATING EQUIPMENT by AGF PIONEERS

If your product can be gently tumbled at  $\frac{1}{2}$  of a R.P.M., the AGF Continuous Rotary Retort Furnace can reduce your heat treating costs. An alloy retort throughout its length has an integral inner spiral that carries the work through the heat treating cycle.



Send sample and ask for recommendation of proper equipment for your work. No Obligation. Factory trained representatives in principal industrial areas.



**AMERICAN GAS FURNACE CO.**

808 LAFAYETTE STREET — ELIZABETH 4, N. J.

"Pioneers since 1878"

## RIGHT OR WRONG

(Continued from page 18)

the foreman told May that he had received an anonymous letter accusing May of going out with a married man in the company. May became frightened.

"What should I do?" she asked.

"To keep down talk and embarrassment, I advise you to resign", the foreman answered. "In fact, I think that's just what you should do."

May packed her things, signed out, and left. A few days later May showed up and said that she changed her mind. Nothing doing, said the company. You resigned and that's that. She filed a grievance to get her job back. At the arbitration, May argued:

1. I was forced to resign.
2. The foreman had no business to suggest that I quit. My work was good, and my personal life is my own affair.

The company didn't go along and maintained that an important principle was involved. Once a person resigns, a company is under no obligation to reinstate him.

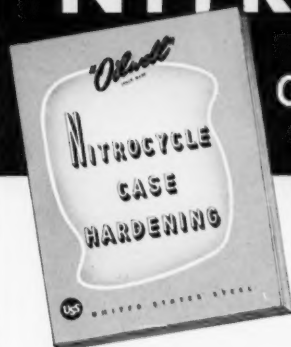
Was The Company: RIGHT ☐ WRONG ☐

### What Arbitrator J. M. Klamon Ruled:

"A basic point is whether the termination was truly voluntary, or involuntary. If an employee advises the company he or she wishes to resign, the company has every right to accept such voluntary resignation forth-

# NITRIDE

the  
Cost Cutting  
Way



This  
Handbook  
tells you  
HOW!

For extreme case hardness where distortion from heat presents a critical work factor, the revolutionary new process that is explained in this handbook will greatly reduce finishing costs.

Send for your free copy today!

## OIL WELL SUPPLY DIVISION

UNITED STATES STEEL CORPORATION

Oil City, Pennsylvania

Licensors for the



## NITROCYCLE PROCESS

UNITED STATES STEEL

with, and no grounds for any grievance exist. This is an important management right. To hold otherwise would be to force the company to reinstate any employee who might voluntarily resign and then have a change of heart. Was the resignation in this case forced? We find and hold that it was, and we further find and hold that it was not for any established just cause. We deliberately use the word 'established' just cause, for the record fails to disclose the basis for Foreman Graham's action. May Kane was therefore induced or persuaded to leave without any just cause being shown or proven. She did not come to work intending to resign. I award reinstatement with all rights."

### Under What Conditions Can You Require Employees To Work Outside Their Regular Classifications?

#### What Happened:

It was Saturday morning and the plant was on skeleton crew, there being just a few men in the shipping department. A customer phoned and told the foreman that he was in a hurry for his order and was sending his truck over to get it. When the truck arrived, the supervisor assigned the men in the shipping department to do the loading.

"That's not our job", they complained.

"I know it", said the foreman, "but the regular

loaders don't work on Saturdays and I've got to get this order out to our customer".

"Well, call in the loaders", suggested one of the workers.



"Then I'd have to pay them overtime because they've already put in 40 hours", the foreman answered.

The employees did the work, but filed a grievance. At the hearing, the employer took a positive stand:

1. We have a right to assign workers to do any job as long as we pay them their regular rates and there are no hazards involved.
2. Overtime is not an employee right. The company is under no obligation to make overtime available if it has enough workers to do a job at straight time rates.
3. Besides, this was a temporary assignment for the shipping boys, and we've always had a policy of shifting employees on a temporary basis.

The workers' position was:

1. Management should not make unreasonable transfers just to avoid overtime payments.
2. This was no real emergency. A few telephone calls would have netted the regular truck loaders.

Was The Company: RIGHT ☐ WRONG ☐

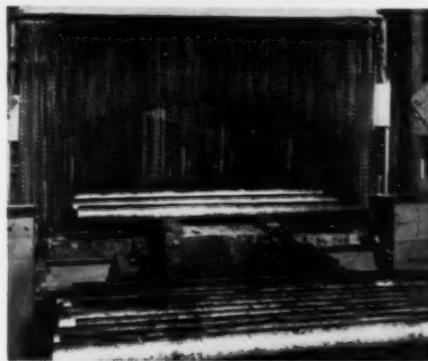
#### What Arbitrator Sanford H. Kadish Ruled:

"The employer is under no duty to assign overtime work. The work could have been performed by employees during their regular workday. Besides, the company's past practice of assigning employees to temporary jobs out of classification makes the grievants' position untenable. Grievance dismissed". ■ ■ ■

More and better machines in our factories have freed men from heavy toil, made their work easier to perform, enabled them to find more satisfaction in jobs which call for their higher skills. This process of unending growth, through technological advance and increased productivity, does not simply enlarge our economy but transforms it.

It's always easier to arrive at a firm conviction about a problem after you know what the boss thinks.

The eternal triangle: income, overhead and upkeep!



Installation of Wiegand Chain Curtain 6½ ft. wide by 3 ft. long in the charging end of a conveyor heat treating furnace. A constant operating temperature of 1650° F is maintained.

**HEAT IS MONEY—  
SAVE IT WITH**

### WIEGAND CHAIN CURTAINS

Every heat treater knows that the control and efficient use of heat is the answer to many basic heat treating problems. Wiegand Chain Curtains, manufactured by E. J. Codd Co., Baltimore, Md., when used to cover oven or furnace openings wherever solid doors are impractical, result in substantial fuel savings and more uniform furnace temperatures. Available in sizes to your specifications and for temperatures ranging up to 1750 degrees, these chain curtains have proved themselves in a great variety of furnace and oven installations during the past 40 years.

Write for Our Booklet "Chain Furnace Curtains"

**E. J. CODD COMPANY**

700-2 South Caroline Street  
Baltimore 31, Maryland



**THE MOST FOR YOUR  
"ROCKWELL TESTING"  
DOLLAR!**

The Clark Hardness Tester is precision built to give guaranteed precision results. Thousands of Clarks, with years of service all over the world, attest to this.

The surprisingly low price includes the precision Clark Diamond Cone Penetrator, as well as Steel Ball Penetrators, a wide assortment of Anvils, Test Blocks, and other accessories. Available in two models, for Standard and Superficial "Rockwell" hardness testing, each with choice of 8", 12", or 16" work capacity.

Before you invest in any hardness tester, get the facts about the low price, speedy delivery, and guaranteed accuracy of the Clark. Write today.

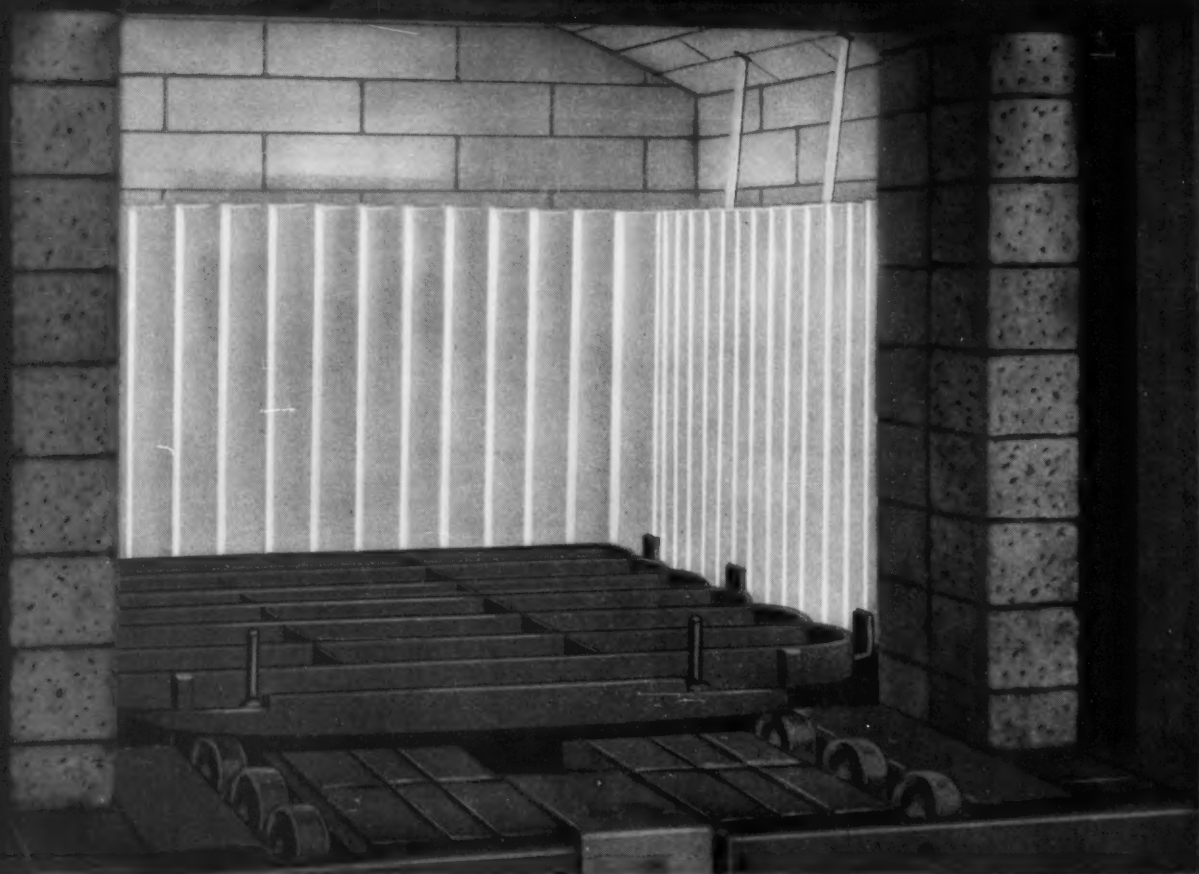


CLARK  
HARDNESS TESTER

**CLARK INSTRUMENT, INC.**

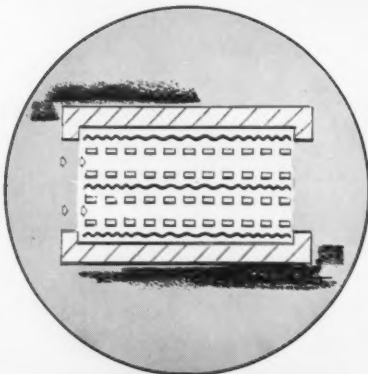
10203 FORD ROAD  
DEARBORN, MICH., U.S.A.

# BRAND NEW—MODERN ELECTRIC ELEMENT

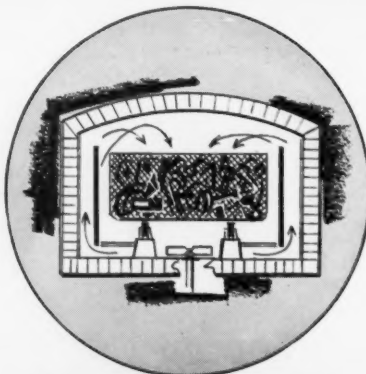


This shows graphically how the new Lindberg CORRTHERM electric heating element actually fills the furnace with walls of glowing heat. Note also that CORRTHERM is conveniently hung

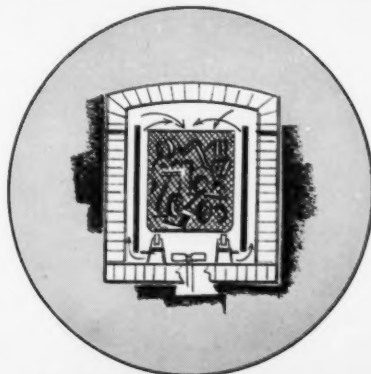
from simple brackets requiring no complicated connections or construction. This element operates at extremely low voltage, eliminating shock or short hazards.



In continuous type furnaces CORRTHERM elements hang between lines of work as well as on side walls. Note how closer corrugations (at each end of element) compensate for incoming cold work and door losses.



CORRTHERM elements act as natural baffles to direct forced convection streams through the charge. The use of electric furnaces for carburizing and carbonitriding now becomes completely practical.



No retort needed in pit-type carburizing furnace with CORRTHERM elements. Again see how elements serve as baffles to direct forced convection stream through charge.

# FOR LINDBERG FURNACES

Never before has there been an electric heating element like this CORRATHERM by Lindberg. Its revolutionary advantages now make the use of electricity as the source of heat, practical, efficient and economical for all heat treating processes.

Ideal for use in any electric heat treating furnace, CORRATHERM elements have particular advantages for carburizing and carbonitriding. This new element completely eliminates problems formerly created by the use of electricity in these types of furnaces. These exclusive advantages of CORRATHERM explain how and why:

**LOW VOLTAGE:** Operates at extremely low voltage. No leakage through carbon saturation. Around Lindberg we talk about it as the electric element "without any electricity . . . to speak of!"

**ATMOSPHERE CIRCULATION:** Elements act as baffles to direct circulation of convection streams.

**SAFETY:** Extremely low voltage also eliminates shock or short hazards.

**DURABILITY:** Watts density at all-time low. Element practically indestructible. Work load or operator's charging tool can't hurt it.

**EASILY INSTALLED:** Element is not enclosed, just hangs in furnace. No complicated mountings required.

If electricity is the preferable source of heat for your metal treating processes find out how advantageously CORRATHERM elements can be applied to your requirements. Just get in touch with your nearest Lindberg Field Representative. (Consult your classified phone book.)

## LINDBERG

LINDBERG ENGINEERING COMPANY

2466 West Hubbard Street, Chicago 12, Illinois

Los Angeles Plant: 11937 South Regentview Avenue, at Downey, California

Associate Companies: Lindberg Industrial Corporation, Chicago • EFCO-Lindberg, Ltd., Montreal, Canada  
Lindberg Italiana, Milan, Italy • The Electric Furnace Company, Ltd., Weybridge, Surrey, England  
Etablissements Jean Aubé, Paris, France • Lindberg Industrie Ofenbau, Gross Aulheim, Germany



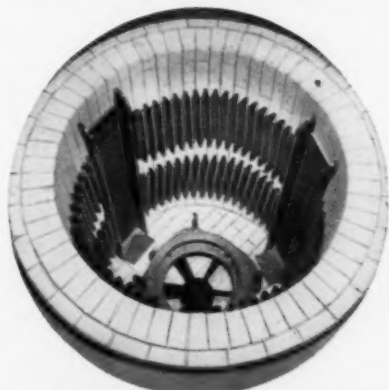
Safety! Extremely low voltage makes CORRATHERM elements completely safe. Let operator or work load bang it if they will. Neither element nor operator will be hurt.



CORRATHERM elements are large sheets of corrugated nickel chromium. They were developed in Lindberg laboratories by Lindberg metallurgists and engineers.



This shows installation of CORRATHERM elements in one of two large rotary furnaces currently being erected in the field by Lindberg's associate company, Lindberg Industrial Corporation.



An installation of CORRATHERM elements in a carburizing pit-type furnace. Simplicity of mounting makes replacement easy and economical.

# CORRATHERM

by LINDBERG



**There's More Than One Kind  
of Plating Basket and Heat  
Treating Fixture and  
WIRETEX MAKES  
THEM ALL!**

**Just Two Examples:**

(A) Carries 2½ ton load into a pit furnace 2,200 F temp. Three units, each 34½" x 22".

(B) Nitriding process basket for temp. to 2,000 F. 27" x 12" deep each.

**CALL WIRETEX**  
for all your • Baskets  
• Muffles • Screens  
• Fixtures • Grids  
• Racks • Large or Small  
• One or a Million  
• To resist heat, acid, abrasion or exposure . .  
in every weave, metal or alloy.

Specialists in Processing  
Carriers Since 1932

**Wiretex mfg. co.** 16 Mason St.  
Bridgeport 5, Conn.



"OK, ... IT'S SALTED TO TASTE, NOW HOW ABOUT A DASH OF PAPRIKA?"

## THE SMOG PROBLEM

(Continued from page 16)

opacity of 40% or more (No. 2 on the Ringelmann Chart) is sufficient to warrant a citation, although efforts are being made to lower the maximum opacity permitted to 20% (No. 1) to secure greater control over sources of smoke.

At present, heat treating plants are among those which must obtain permits from the District before altering, moving, or constructing any basic equipment, but because of minimum contribution to smog, the District has recommended exempting them from these permit regulations.

Still regulated, however, would be salt baths, gas and oil-fired furnaces and other equipment capable of emitting considerable quantities of pollutants.

While many of the measures and controls over heat treating plants are peculiar to the Los Angeles Basin, it should be pointed out that with increasing quantities of smog being reported in other areas, they could very well become common in all industrial centers.



Fig. 2—Tray of parts is lowered from de-greaser (left, background); will be placed in bins at left ready for hardening in furnaces at right. Before installation of vapor de-greaser, shop was usually filled with smoke.

This was underscored by *Fortune* magazine in its April, 1955, issue, in which it was stated that an estimated 50 million tons a year of "garbage in the sky" are produced in the country. Putting the lid on the garbage can is a complex and expensive operation, but one which must be accomplished. Every industry from the biggest steel smelter down to the smallest heat treating shop, will eventually be affected. ■ ■ ■

## Remember!

The Annual Meeting of the Metal Treating Institute will be held at the Hotel Cleveland, Cleveland, Ohio, October 5, 6, and 7.

## THE SECONDARY BOYCOTT

(Continued from page 12)

### Can You Identify Some of These Loopholes?

One loophole, for instance, is that in certain cases pickets may follow the product of an employer from the place where it is made to the place where it is sold. Another loophole is that the law makes no mention against pressure by unions on employers, although it specifically prohibits pressure on employees. The unions take this to mean they are free to coerce neutral employers.

Other loopholes are over the meaning of the term "in the course of employment" and the definition of "employer." Another major permission to engage in secondary boycotts is the Board's approval of "hot cargo" contracts. These contracts make it possible for a big union to force an employer to agree by contract that he will not do business with any other employer the union decides is "unfair."

### Can Secondary Boycotts Be Stopped?

The answer is yes! We do not need to permit this kind of abuse of power by labor unions. We can stop it. The law needs revision to plug loopholes and correct misinterpretation. But that is still not enough.

### What Else Is Needed?

What is needed most is a belief by businessmen generally that freedom of choice is a cornerstone of

our economic system and that monopolistic acts in restraints of trade are evil no matter by whom practiced. Then when businessmen are confronted with threats or propositions or deals by labor unions they should stand up and fight for freedom of choice of goods and refuse to be a party to a secondary boycott, however obscure the relationship.

### When Do You Think the Fight Against Unfair Union Boycotts Will Be Won?

I believe we will rid the country of the evil of unfair union boycotts only when businessmen generally recognize them as evil and dangerous to our economic system. Only then will we have a revision of Taft-Hartley or some other new law.

### What Can Be Done in the Meantime?

Publicity is one of the greatest weapons to combat a union's unfair activities. Unions fear a public opinion aroused to their abusive tactics. When a businessman learns of facts which appear to be a secondary boycott he should call attention to his local newspaper and inform his state and federal legislative representatives, and alert the Congressional action committee of his local Chamber of Commerce.

I also would appreciate having the Secondary Boycott Committee of the U.S. Chamber of Commerce in Washington being advised. The committee is trying to alert the public to the dangers and expense of secondary boycotts. ■ ■ ■

## New Pangborn Hydro-Finish

solves such cleaning problems as:

- \* deburring
- \* surface finishing
- \* finishing threaded sections
- \* improving cutting tool life
- \* maintaining dies and molds
- \* removing grinding lines
- \* removing heat treat scale
- \* preparing surfaces



Pangborn has redesigned the Hydro-Finish for added efficiency and easier handling. Originating the use of air jet sluriators to eliminate pumps, the new Hydro-Finish represents a lower investment as well as a lower maintenance cost. Optional equipment simplifies overall operation. Investigate Pangborn Hydro-Finish now!

For full details, send for Bulletin 1403, now! Write to: PANGBORN CORPORATION, 3600 Pangborn Boulevard, Hagerstown, Maryland. Manufacturers of Blast Cleaning and Dust Control Equipment.

1H

# Pangborn

**BLAST CLEANS CHEAPER**

# ROLOCK

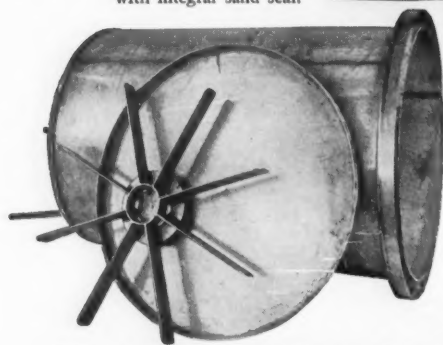
FABRICATED ALLOYS

HEAT AND CORROSION  
RESISTANT



Stainless steel hoods for bell-type bright annealing furnaces. 77" O.D. x 88" high.

A special and very successful Rolock design with integral sand seal.



A special design built within a few days without costly patterns.

*Engineered*  
**FURNACE  
RETORTS**  
*that* **SERVE BETTER  
LAST LONGER  
COST LESS**  
*per furnace hour*



Here are three of the important furnace retort designs currently fabricated by Rolock specialists . . . each making an impressive record of excellent, low-cost service. Essential features include experienced design and construction engineering . . . unique Rolock know-how and experience in fabricating modern high-heat-resistant wrought alloys . . . quality standards maintained and safeguarded by detailed X-ray and other forms of inspection. Write for our new comprehensive catalog, or send your prints for quotation.

SALES AND SERVICE REPRESENTATIVES FROM COAST TO COAST  
ROLOCK INC., 1232 KINGS HIGHWAY, FAIRFIELD, CONN.

**JOB-ENGINEERED** for better work  
Easier Operation, Lower Cost

3RL56

## LETTERS

TO THE



EDITOR

Gentlemen:

Please send further information about the Dew-Point Indicator listed as #17 in your November-December issue for 1955.

I would like to be placed on your mailing list to receive METAL TREATING.

J. W. WATSON  
Process Metallurgist  
Link-Belt Company  
Indianapolis, Ind.

Ed.—The request for further information was forwarded to the General Electric Company, and he shall receive the magazine regularly in the future. Glad to note that non-subscribers get to see a copy, are interested, and request to be added to the mailing list.

Dear Sirs:

Please send us information about membership in MTI, complete with cost and whatever forms that we must complete.

We have been receiving your Magazine and the valuable articles it carries.

L. J. VIEAU  
General Manager  
Houston Heat Treating Co.  
Houston, Texas

Ed.—Glad to see interest in both the Institute and METAL TREATING, and the necessary information was sent.

Gentlemen:

Our Technical Methods Branch is concerned with the quality of heat treatment performed by Air Force contractors located throughout the states of Michigan, Indiana, Ohio, Kentucky, Tennessee and Alabama. Therefore we would like to have the name of our organization added to the list of companies that receive your publication "METAL TREATING".

Judging by your September-October 1955 issue, your magazine will be read from cover to cover by our technical personnel.

ALVIN E. GREENHORN

Lt. Colonel, USAF  
Chief, Quality Control Division  
Directorate, Procurement & Production  
Brookley Air Force Base  
Alabama

Ed.—Thank you for the kind words. We are always glad to hear that the magazine is being well-received and useful. We hope that it will continue to be of service to your personnel.

Gentlemen:

We should be glad to have your kind attention on this request for one copy of the issue for May-June 1955 of your review "METAL TREATING", vol. 6, containing, pages 2-4, the paper:

Harker (T.W.) "Bright hardening and bright tempering of corrosion-resistant and high-temperature alloys."

Thank you best in advance for a prompt attention.

MAX DUPONT,  
Manager,  
Centre de Documentation  
Siderurgique  
Paris, France

Ed.—Our foreign readers are interested in the articles also, and a copy was sent with no charge.

Gentlemen:

Information is requested as to the availability and cost of your excellent publication "Metal Treating". We have found many of your articles of great value in connection with our Metallurgical Services Department work.

As I have recently moved to Atlas Steels Limited from the University of Minnesota where I had access to Dr. R. L. Dowdell's copies, I now miss being able to lay a hand on a copy of "Metal Treating".

W. B. F. MACKAY  
Product Development Engineer  
Atlas Steels Limited  
Welland, Canada

Ed.—Always glad to hear that the calibre of the editorial content of "Metal Treating" is of such quality as to be of value and service to metallurgists in the industry.

JULY-AUGUST 1956



**PSC**

## RADIANT TUBES SAVE YOU MONEY

on any design

PSC "Thin-Wall" sheet-alloy radiant tubes will cost you less than cast alloy tubes. Comparative quotations will immediately reveal the substantial savings. And, with dies on hand for many commonly used sizes of return bends, we can frequently save our customers this important cost also. Scores of installation records attest to their longer service life. Precision assembled in any design or dimension. Also sheet-alloy heat-treating retorts and covers, boxes, baskets, fixtures, tubes, etc. We invite your inquiries.

*Send for Heat Treat Catalog 54*

**THE PRESSED STEEL CO.**  
Wilkes-Barre, Pa.

# Tempilstik<sup>o</sup>

**FOR ALL  
HEAT-DEPENDENT  
OPERATIONS**

*looks like a crayon ... marks  
like a crayon ... tells temperatures  
like a precision instrument!*

Here's a unique marking crayon that helps you determine and control working temperatures from 113° to 2000° F. Available in 63 different melt ratings, TEMPILSTIK<sup>o</sup> is accurate within 1% of its rated melting point.

TEMPILSTIK<sup>o</sup> is also available in liquid and pellet form. Write for information and sample pellets, stating temperatures of interest.



**METAL & THERMIT  
CORPORATION**

GENERAL OFFICES: RANNEY, NEW JERSEY

WELDING SUPPLIES  
RADIOGRAPHIC EQUIPMENT  
PLATING MATERIALS  
ORGANIC COATINGS  
CERAMIC MATERIALS  
TIN & TIN CHEMICALS  
METALS & ALLOYS  
HEAVY MELTING SCRAP



# MANUFACTURERS' LITERATURE

For your copy circle  
the number on the  
Readers' Service Card

## MECHANIZED HEAT TREATING EQUIPMENT

The detailed story of how cast high alloy furnace parts and auxiliary equipment are aiding the mechanization of heat treating operations is now available from the Alloy Casting Institute, Mineola, New York. The four-page article is entitled "Materials Handling At High Temperature Mechanized With Cast High Alloy Heat Treating Parts". Although the story is concerned entirely with heat treating operations—carburizing, normalizing, hardening and annealing—at the Tractor Works of the International Harvester Company, basic principles involved in design and application of high alloy castings in various atmosphere and high temperature conditions are also explained.

*For further information circle No. 9*

## ROLLER CHAIN BOOKLET

One of the most complete lines of precision roller chain and sprockets made is described thoroughly in this 148-page book by Link-Belt Company. It includes sections on stock drives, drive chain, conveyor chain, installation and maintenance, lubrication, sprocket wheels, casings, and chain tighteners, among others. Thoroughly illustrated, this book gives all the information necessary to choose the right roller chain for a given application.

*For further information circle No. 10*

## AMMONIA CYLINDERS

A handy wall chart giving information on the handling and storage of ammonia cylinders and first aid suggestions for use in an emergency

has been prepared by the Ammonia Division of Armour and Company.

On one side of the card is printed five rules for handling cylinders, while the other side has six first aid suggestions.

Ammonia users are cautioned against storing cylinders near flammable substances. In case of an accident resulting in injuries, a series of "do's and don'ts" is provided.

*For further information circle No. 11*

## WIRE CATALOG

The Colorado Fuel and Iron Corporation has made available a new 12-page illustrated booklet supplementing its Wickwire Springs and Formed Wire catalog.

The booklet illustrates the various types of Wickwire springs and formed wire including compression springs, extension springs, torsion springs, flat wire springs, and formed wire. Complete specifications for ordering are detailed in the booklet.

*For further information circle No. 12*

## INDUCTION HEATING DATA SHEET

Complete information about L & N's small-target, high-speed Rayotube detector and Speedomax G controller for high frequency induction heating is now available in a 2-page data sheet just published by Leeds & Northrup Company. This new data sheet describes how this equipment is being used on continuous, batch and selective induction heating processes.

Included in this sheet is a full description of the 8891-C Rayotube and the Speedomax G controller. Specifications and standard ranges

for both Rayotube and Speedomax G are conveniently tabulated. "How To Order" instructions complete the sheet.

*For further information circle No. 13*

## CONTROLLED ATMOSPHERE FURNACES

A four-page two-color bulletin which fully describes the complete line of Lindberg Hydriding Furnaces for hardening high carbon and high speed tool steels without scale, decarb or carburization has been issued by the Furnace Division of Lindberg Engineering Company.

Cross-section diagrams, specifications and performance data on pre-heat and high speed furnaces are listed. Included is an informative discussion on the operation and features of the company's Hyen hydriding generator, an inexpensive and fully automatic process for producing atmosphere.

*For further information circle No. 14*

## HEAT TREATING AID

The Wiedemann Machine Company, Philadelphia, Pa., has recently announced the availability of a 4-page bulletin which they have prepared as an industry service on the general subject of the problems encountered in the heat treating of tool steels particularly concerning the matters of uncompensated shrinkage or expansion.

The informative pamphlet is entitled "Factors to Consider About Tool Steel"; is not exhaustive nor too highly technical; and yet contains many helpful suggestions and charts for the heat treater. It is available free of charge.

*For further information circle No. 15*

## ELECTRIC FURNACE BULLETINS

Two four-page bulletins recently issued by the General Electric Company, Schenectady, N. Y. give general information, application examples, and cross-section diagrams of car-bottom and rotary-hearth electric furnaces.

The car-bottom furnace is for annealing bar stock, tubes, forgings, steel castings, and welded structures. The rotary-hearth furnaces have a maximum operating temperature of 1800°F.-2500°F., and are particularly suitable for heat treating parts that are to be fixture quenched or individually handled.

*For further information circle No. 16*

## ULTRASONIC SYSTEMS AND APPLICATIONS

The benefits which may be derived from ultrasonic techniques in cleaning and degreasing, electroplating, drilling and grinding operations are reported in a new bulletin just published by Acoustica Associates, Inc., Glenwood Landing, L. I., New York.

Entitled, "Ultrasonic Barrier Broken by Low Cost Power Supply," the 4-page, 2-color bulletin also describes various ultrasonic power supplies, transducers, and systems offered by Acoustica for small and large scale production requirements.

*For further information circle No. 17*

## REBUILT MACHINE TOOLS

In pictures and captions, the newest 8-page edition of THE SIMMONS WAY of the Simmons Machine Tool Corporation, Albany, New York, describes a series of new special-application machine tools, and rebuilt and modernized equipment.

Illustrated case histories tell how Simmons rebuilt and modernized two obsolete vertical boring mills, readying them for 1956 production at large savings to the owners. Other articles tell how special production problems were met and solved.

*For further information circle No. 18*

## WET BLASTING MACHINES

Two bulletins issued by the American Wheelabrator & Equipment Corp., Mishawaka, Ind., describe in detail and with suitable illustrations two different models of their "Liquamatte" wet blasting machines.

Typical applications of both models are removing heat treat scale, surface cleaning, preparing surfaces for plating and other coatings, and fine deburring.

Model 64 is said to be ideally suited for fine or coarse finishing

jobs on large pieces that go through a door 49" x 36", while Model 30 is best suited for pieces that will go through a door opening 22½" x 19".

*For further information circle No. 19*

## HANDBOOK ON TITANIUM

An Air Force handbook on the properties and production of titanium, in two volumes, has been released for distribution to industry through the Office of Technical Services, U.S. Department of Commerce.

The information contained in

**HEAT AND CORROSION RESISTANT  
CASTINGS & FABRICATIONS**

**RADIANT TUBE ASSEMBLY**

This General Alloys Company design combines castings and fabrications to obtain the best features of each for optimum performance and service life. The fabricated straight sections are light in weight and provide for maximum efficiency of heat transfer. The cast return bends offer maximum resistance to gas erosion and eliminate the welded area susceptible to early failure resulting from flame impingement. These tubes are available in many shapes and sizes. Let our engineering staff help you solve your heat resisting alloy problems.



**GENERAL ALLOYS COMPANY**  
FABRICATED ALLOY DIVISION  
403 WEST FIRST STREET • BOSTON 27, MASSACHUSETTS

the two-part handbook was collected through literature survey and by personal contact with authoritative individuals and institutions. The work was done by Dr. H. K. Adenstedt, staff metallurgist of the Lycoming Division, Avco Manufacturing Corporation, under contract with Wright Air Development Center, U.S. Air Force.

Part I, whose three major sections cover titanium production, physical metallurgy, and properties, was completed in August 1954. Part II, with two major sections, covers laboratory procedures and fabrication. It was completed in September 1955, following a year's investigation.

*For further information circle No. 20*

### METAL FINISHING

A new booklet, "Chemical Finishing of Metals," contains valuable information to help design engineers and purchasing agents find new ways to cut manufacturing costs through substitution of low-cost, "treated" base metals and re-

placement of expensive plating operations.

Useful for design and reference, the booklet describes aluminum anodizing and alodizing; surface conditioning, and various other types of conversion coatings obtainable on aluminum, magnesium, and steel. Finishes, in a variety of colors and textures, differ from plating in that the coatings produced are chemical conversion coatings.

The series of articles, tables, and charts were compiled by J. H. Goodyear, vice president and chemical finishing specialist of J. W. Rex Co., Lansdale, Pa.

*For further information circle No. 21*

### REMOTE CONTROL BROCHURE

A four-page brochure covers plug-in package remote control system for two-position discreet operation of starters, pumps, valves, loaders, gates, operators, etc. It describes the system and techniques, and is published by the Sparton Control Systems Div., The Sparks-Withington Co., Jackson, Mich.

*For further information circle No. 22*

### SNAP HEARTH FURNACE

A new Snap Hearth Furnace has been added to the line of 'Surface' standard furnaces manufactured by Surface Combustion Corp., Toledo, Ohio.

This new furnace is the first suspended hearth type with radiant tube heating. It eliminates the old muffle with its maintenance and replacement problems. Suction type radiant tubes prevent contamination of prepared atmosphere.

The new snap hearth furnace is described in a 4-page two-color folder which shows diagrams, curves and application pictures.

*For further information circle No. 23*

### ELECTRICAL HEATERS

A revised catalog that describes industrial electrical heating units and devices is available from the Westinghouse Electric Corporation. The catalog contains information and design selection charts on strip heaters, natural and forced convection air heaters, oven heaters, immersion heaters, cartridge heaters, melting pots, industrial hot plates, and heater control equipment. Information about selection of many special types is also included.

*For further information circle No. 24*

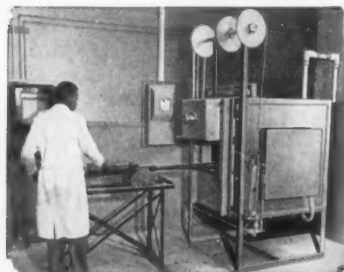
### INDUSTRIAL TRUCKS

A new four-page brochure commemorating its 50th year of industrial truck production has been released by The Elwell-Parker Electric Co., Cleveland, Ohio.

The free literature illustrates the world's first industrial truck ever built which was introduced by the company in 1906. In marked contrast, it likewise pictures and describes six new lines of Elwell-Parker trucks, including its new low headroom fork truck series, a new line of high lift platform trucks, its new die handling truck series, a new die handling truck for inclined presses, a new line of stand-up, center control fork trucks, and a new gas powered low lift platform truck series.

*For further information circle No. 25*

## The Name That You Can Depend Upon



for  
**USER-  
PROVED  
UNITS**

Even High Speed Steels—  
handled with this  
Full-Range  
general-purpose  
heat-treating  
furnace

**MODEL  
FG-430**

Standard and  
Special Units  
450° F. to  
5000° F.

A Pereco Furnace cuts costs in many ways! Saves time—cuts man hours—reduces spoilage—saves on maintenance—insures better results! Why? Because clean electric heat is put under accurate, versatile control—with unmatched specialized equipment design—in a Pereco Furnace. Get the details and compare.

**PERENY EQUIPMENT CO.**

Dept. O, 893 Chambers Rd., Columbus 12, Ohio

**PERECO**  
ELECTRIC FURNACES



# METAL TREATING

## EQUIPMENT and MATERIALS DIRECTORY

### AGITATORS

J. P. DEVINE MANUFACTURING CO.  
49th Street and A. V. R. R.  
Pittsburgh 1, Pennsylvania

★ ★ ★

### HEAT TREATING FIXTURES

E. J. CODD COMPANY  
700 S. Caroline Street  
Baltimore 31, Maryland

GENERAL ALLOYS COMPANY  
367-405 West First Street  
Boston 27, Massachusetts

INTERNATIONAL NICKEL CO., INC.  
67 Wall Street  
New York 5, New York

MISCO FABRICATORS, INC.  
1999 Guoin Street  
Detroit 7, Michigan

THE PRESSED STEEL COMPANY  
Wilkes-Barre, Pennsylvania

ROLOCK INC.  
1232 Kings Highway  
Fairfield, Connecticut

STANWOOD CORP.  
4825 W. Cortland St.  
Chicago 39, Ill.

WIRETEX MFG. CO., INC.  
16 Mason Street  
Bridgeport 5, Conn.

★ ★ ★

### CLEANING EQUIPMENT

PANGBORN CORPORATION  
Hagerstown, Maryland

★ ★ ★

### FABRICATION

(Heat & Corrosion Resistant)

WIRETEX MFG. CO., INC.  
16 Mason Street  
Bridgeport 5, Conn.

★ ★ ★

### FURNACES

AMERICAN GAS FURNACE CO.  
808 Lafayette Street  
Elizabeth, New Jersey

DENVER FIRE CLAY COMPANY  
2301 Blake Street  
Denver, Colorado

DOW FURNACE COMPANY  
12045 Woodbine Ave.  
Detroit 28, Michigan

ECLIPSE FUEL ENGINEERING CO.  
1018 Buchanan Street  
Rockford Illinois

HEVI DUTY ELECTRIC COMPANY  
Milwaukee 1, Wisconsin

HOLCROFT AND COMPANY  
6545 Epworth Boulevard  
Detroit 10, Michigan

INDUSTRIAL HEATING EQUIPMENT CO.  
3570 Fremont Place  
Detroit 7, Michigan

IPSEN INDUSTRIES, INC.  
717 S. Main Street  
Rockford, Illinois

LINDBERG ENGINEERING CO.  
2466 W. Hubbard Street  
Chicago 12, Illinois

PERENY EQUIPMENT CO.  
893 Chambers Road  
Columbus 12, Ohio

SARGEANT & WILBUR, INC.  
185 Weeden Street  
Pawtucket, Rhode Island

SURFACE COMBUSTION CORPORATION  
HEAT TREAT DIVISION  
Toledo, Ohio

★ ★ ★

### FURNACES (Salt Bath)

AJAX ELECTRIC CO.  
940 Frankford Avenue  
Philadelphia 23, Pa.

THE A. F. HOLDEN CO.  
14341 Schaefer Highway  
Detroit 27, Mich.

★ ★ ★

### GASES

ALLIED CHEMICAL AND DYE CORP.  
NITROGEN DIVISION  
40 Rector Street  
New York 6, New York

ARMOUR AND COMPANY  
AMMONIA DIVISION  
1355 W. 31st Street  
Chicago, Illinois

★ ★ ★

### GAS GENERATORS

HEVI DUTY ELECTRIC COMPANY  
Milwaukee 1, Wisconsin

HOLCROFT AND COMPANY  
6545 Epworth Boulevard  
Detroit 10, Michigan

LINDBERG ENGINEERING CO.  
2466 W. Hubbard Street  
Chicago 12, Illinois

SARGEANT & WILBUR, INC.  
185 Weeden Street  
Pawtucket, Rhode Island

★ ★ ★

### HEATING ELEMENTS (Non-Metallic)

NORTON COMPANY  
Worcester 6, Massachusetts

★ ★ ★

### NITRIDING

UNITED STATES STEEL CORP.  
OIL WELL SUPPLY DIVISION  
Oil City, Pennsylvania

★ ★ ★

### IMPREGNATION EQUIPMENT

J. P. DEVINE MANUFACTURING CO.  
49th Street and A. V. R. R.  
Pittsburgh 1, Pennsylvania

### METAL FINISHING

ARTHUR TICKLE ENGINEERING WORKS, INC.  
23 Dalevan Street  
Brooklyn, N. Y.

★ ★ ★

### QUENCHING OILS

CITIES SERVICE OIL COMPANY  
20 North Wacker Drive  
Chicago, Illinois

E. F. HOUGHTON & CO.  
303 W. Lehigh Avenue  
Philadelphia 33, Pennsylvania

PARK CHEMICAL COMPANY  
8076 Military Avenue  
Detroit 4, Michigan

SHELL OIL COMPANY  
50 West 50th Street  
New York 20, New York

SUN OIL COMPANY  
Industrial Products Department  
Philadelphia 3, Pa.

★ ★ ★

### REFRACTORIES

DENVER FIRE CLAY COMPANY  
2301 Blake Street  
Denver, Colorado

NORTON COMPANY  
Worcester 6, Mass.

★ ★ ★

### SALTS

ALLIED CHEMICAL AND DYE CORP.  
NITROGEN DIVISION  
40 Rector Street  
New York 6, New York

AMERICAN CYANAMID COMPANY  
METAL CHEMICALS SECTION  
30 Rockefeller Plaza  
New York 20, New York

THE A. F. HOLDEN CO.  
14341 Schaefer Highway  
Detroit 27, Mich.

E. F. HOUGHTON & CO.  
303 W. Lehigh Avenue  
Philadelphia 33, Pennsylvania

PARK CHEMICAL COMPANY  
8076 Military Avenue  
Detroit 4, Michigan

★ ★ ★

### STRAIGHTENING EQUIPMENT

GENERAL MANUFACTURING COMPANY  
6437 Farnsworth  
Detroit 11, Michigan

★ ★ ★

### TEMPERATURE CONTROLS

IPSEN INDUSTRIES, INC.  
717 S. Main Street  
Rockford, Illinois

METAL & THERMIT CORP.  
100 East 42nd Street  
New York 17, New York

CLARK INSTRUMENT, INC.  
10203 Ford Road  
Dearborn, Michigan

★ ★ ★

### TOOL STEELS

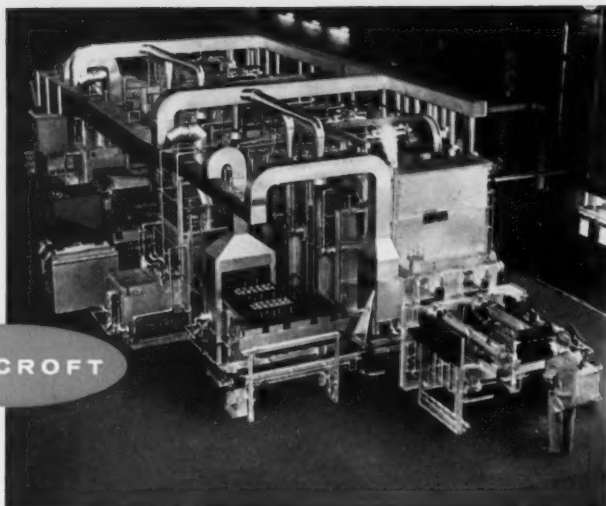
BETHLEHEM STEEL COMPANY  
Bethlehem, Pennsylvania

CRUCIBLE STEEL COMPANY OF AMERICA  
Pittsburgh, Pa.



BLAZING  
THE  
HEAT  
TREAT  
TRAIL—  
WITH

HOLCROFT



LET'S TALK

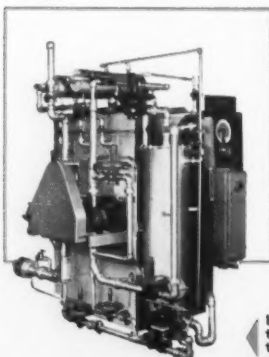
## CONTROLLED ATMOSPHERES

Holcroft has pegged many of its research activities to the problems of controlled atmosphere heat treating. As a result, Holcroft has blazed the trail for industry.

Controlled atmospheres protect the stock while it is being treated and help produce the desired finish to the parts. Scale and decarburization are eliminated. Stock in the furnace chamber is surrounded by a gas atmosphere which excludes all air and products of combustion.

Basic gas generator patents go back to 1883. However, the first real use and understanding of fundamental equilibrium constants—now in general use in all gas atmosphere work—was by Holcroft in 1934. Dew point cups and equilibrium curves were furnished customers at that time. Today, Holcroft's new Lo-Dew generator (750, 1200 and 2400 cfh) provides rated capacities at low dew points.

Advances like these are typical of the scope of Holcroft activities—proof that you can get right answers without prejudice. Insist upon a Holcroft quotation as your first step when you have a heat treat problem. You'll save!



Holcroft's new gas generator designed to produce gas atmospheres between the limits of perfect combustion and modified "302".

## HOLCROFT AND COMPANY



6545 EPWORTH BOULEVARD • DETROIT 10, MICHIGAN

PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO, ILL. • CLEVELAND, OHIO • DARIEN, CONN. • HOUSTON, TEXAS • LOS ANGELES, CALIF. • PHILADELPHIA, PA.  
CANADA: Walker Metal Products, Ltd., Windsor, Ontario

## INDEX TO ADVERTISERS AND THEIR ADVERTISING AGENCIES

Advertiser	Page
Ajax Electric Company	15
Agency—The Harry P. Bridge Company	
Allied Chemical and Dye Corp. (Nitrogen Division)	21
Agency—G. M. Basford Company	
American Cyanamid Company (Metal Chemicals Section) . . . Outside Back Cover	
Agency—Hazard Advertising Company, Inc.	
American Gas Furnace Company	36
Agency—Advent Associates, Inc.	
Armour & Company (Ammonia Division)	5
Agency—Foote, Cone & Belding	
Bethlehem Steel Company	29
Agency—Jones & Brakely, Inc.	
Cities Service Oil Company	17
Agency—Ellington & Company, Inc.	
Clark Instrument, Inc.	37
Agency—Whipple & Black Advertising Company	
Codd, E. J. Company	37
Crucible Steel Company of America . . . . . Inside Back Cover	
Agency—G. M. Basford Company	
Denver Fire Clay Company	27
Agency—Gray & Company, Inc.	
Devine Mfg. Co., J. P.	16
Agency—William Cohen, Advertising	
General Alloys Company	45
Agency—Robert Hartwell Gabine	
General Manufacturing Company	34
Agency—F. B. Hubert Advertising Counselors	
Hevi Duty Electric Company	33
Agency—Camm, Costigan, Inc.	
Holcroft & Company	48
Agency—Gray & Kilgore, Inc.	
Holden Company, The A. F. . . . . Inside Front Cover	
Houghton & Co., E. F.	9
Agency—Beaumont, Heller & Sperling, Inc.	
Industrial Heating Equipment Company	35
International Nickel Company	13
Agency—Marschalk & Pratt	
Lindberg Engineering Company	38-39
Agency—Don Colvin & Company, Inc.	
Metal & Thermit Corporation	43
Agency—RAF Advertising, Inc.	
Metal Treating Institute	24-25
Misco Fabricators, Inc.	34
Agency—L. Charles Lussier, Inc.	
Norton Company	19
Agency—James Thomas Chirurg Co.	
Pangborn Corporation	41
Agency—Vansant, Dugdale & Co.	
Pereny Equipment Company	46
Agency—Wheeler, Kight & Gainey, Inc.	
Pressed Steel Company, The	43
Agency—Wilbur A. Myers	
Rolock, Inc.	42
Agency—Robotham & Peck, Inc.	
Sargeant & Wilbur, Inc.	11
Agency—George T. Metcalf Co.	
Shell Oil Company	23
Agency—J. Walter Thompson Company	
Stanwood Corporation	28
Agency—Tri-State Advertising Co.	
Sun Oil Company	30-31
Agency—Ruthrauff & Ryan, Inc.	
Arthur Tickle Engineering Works	12
Agency—Ritter, Sanford & Price, Inc.	
United States Steel Corp. (Oil Well Supply Division)	36
Agency—Batten, Barton, Durstine & Osborn	
Wiretex Manufacturing Company, Inc.	40
Agency—Bass & Company, Inc.	

METAL TREATING



**best on every point**  
*...and among high speed steels*  
**the top performer is REX**

To leap the hurdle of competition, a product needs performance born of quality. And Crucible's REX® high speed steel has it — in accurate size . . . sound uniform structure . . . dependable response to heat treatment . . . optimum tool performance.

Now, thanks to improved manufacturing techniques, REX is even better — more uniform. Put it to work on your next job, and you'll quickly know why REX is today, as it has always been — *the standard by which all other high speed steels are compared.*

Call for REX at your local Crucible warehouse. Or order it directly for prompt mill delivery. And for a list of available data on REX and other Crucible *special steels*, write now for a free copy of the "Crucible Publication Catalog". Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.

**CRUCIBLE**

first name in special purpose steels

**Crucible Steel Company of America**

Canadian Distributor — Railway & Power Engineering Corp., Ltd.

# HOW SINGER GETS NEEDLE-FINE CONTROL OF CASE DEPTH WITH **AEROCARB® E+W** CARBURIZING COMPOUNDS



The Singer Manufacturing Company, Elizabethport, N. J., finds that AEROCARB E and W Carburizing Baths make it easy to control case depths of their sewing machine parts within thousandths of an inch, producing excellent wear resistance.

Vertical operating presser bar shafts and needle bar shafts for their 99 Class Sewing Machines are case-hardened at 1650°F. SINGER gets fast penetration with minimum distortion, and finds water-soluble AEROCARB E & W easy to remove. Parts emerge from the carburizing operation bright, clean and straight, ready for fast and easy finishing.

AEROCARB E & W can help you, too, get exactly the desired case composition and case depth with low distortion. For specific information on the use of Cyanamid's AEROCARB Carburizing Compounds, mail us the coupon.

## CYANAMID'S HEAT TREATING COMPOUNDS INCLUDE:

AEROCASE® Case Hardening Compounds	AEROMET® Metallurgical Additive
AEROCARB® Carburizing Compounds	Metallic Stearates
AEROHEAT® Heat Treating Compounds	Surface Active Agents
Acids and other Heavy Chemicals	

**CYANAMID**

**AMERICAN CYANAMID COMPANY**  
METAL CHEMICALS SECTION  
30 Rockefeller Plaza, New York 20, N. Y.

Send Technical Data Sheet on AEROCARB E & W Carburizing Compounds.

Name .....

Company .....

Address .....

City ..... Zone ..... State .....

MTS

In Canada: North American Cyanamid Limited, Toronto and Montreal

